American Aviation

MARCH 14, 1955

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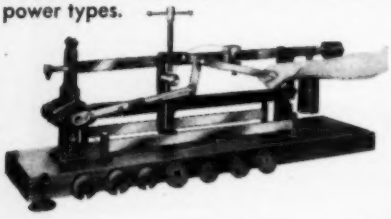

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Air Traffic News (Incorporating Air Traffic Digest): Daily rates and tariff news. $175 per year. Managing Editor—Wallace I. Longstreth.

Airports: Weekly newsletter for airport officials, suppliers, and services. Airmailed every Friday. $25 per year. Managing Editor—Lois C. Philmus.

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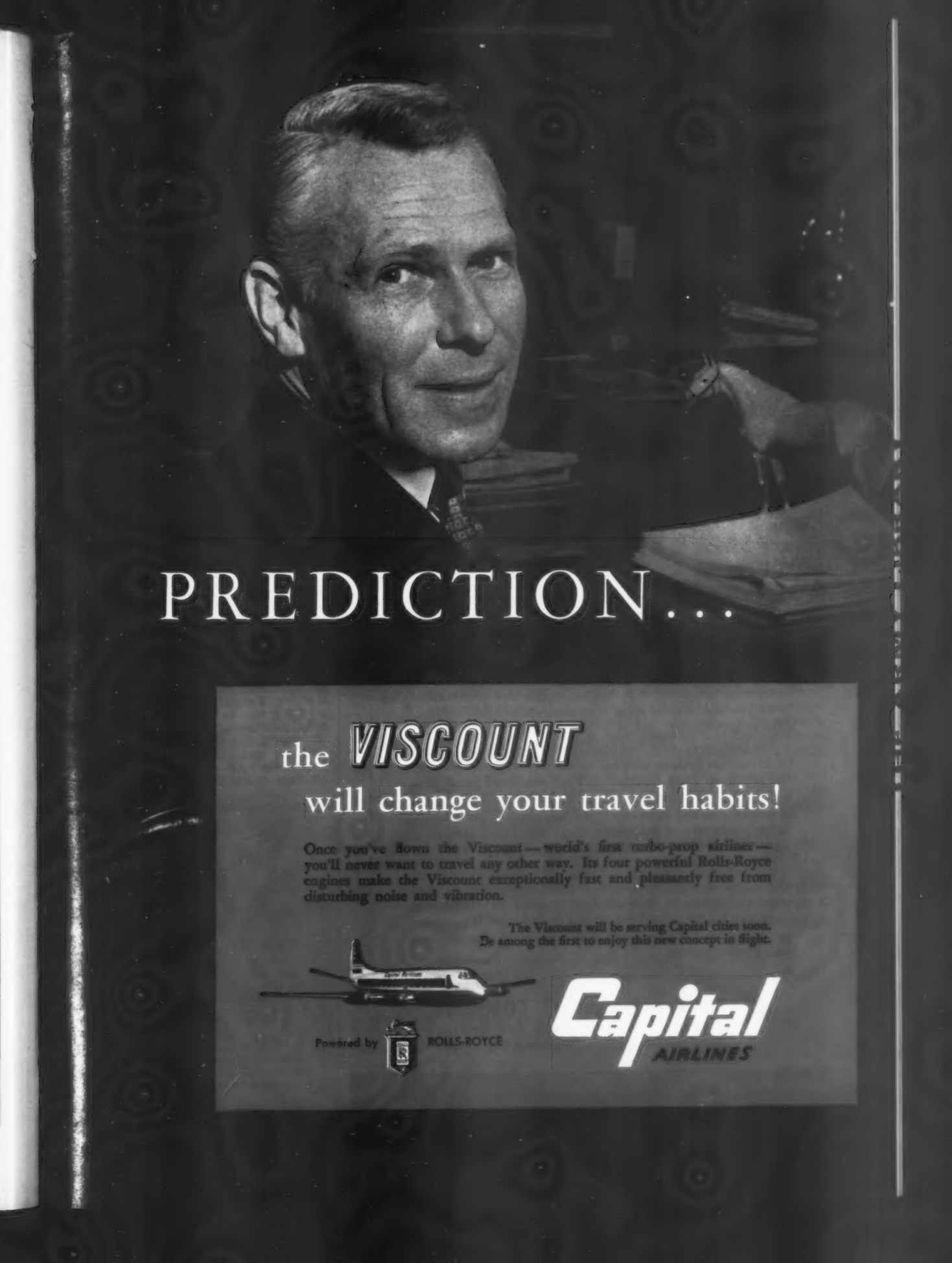
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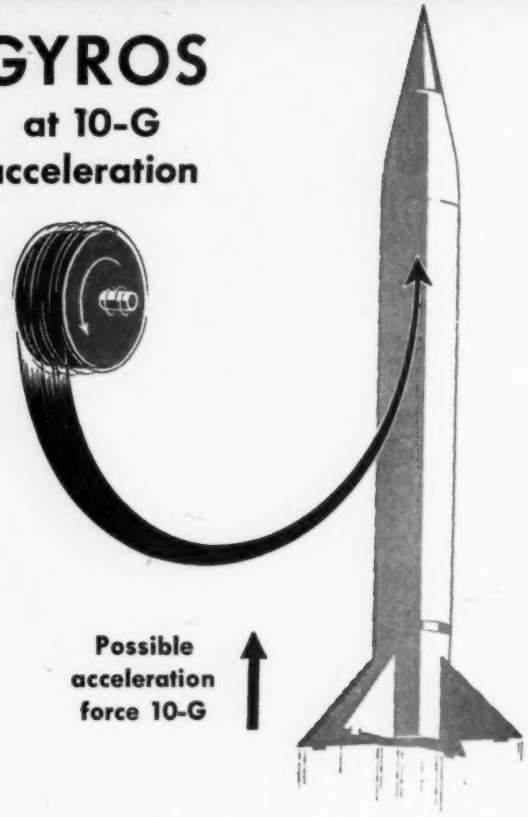

The gyroscope in a missile guidance system must be able to withstand acceleration forces up to 10 G's in any direction. This gyroscope, designed and developed by the Guided Missile Development Division of the U. S. Army and the Ford Instrument Company, will function under this acceleration. Tests have shown these gyros to be accurate to 1/50° per hour drift, or better.

For forty years, Ford has been building gyroscopes, at first for navigation devices, later for stabilization in many fire control problems. Ford designed and manufactured gyros have been in the stabilization systems of heavy battleship guns, in missiles and torpedoes and in delicate airborne instruments. Stable platforms and guidance systems have been outstanding achievements of Ford Instrument Company engineers.

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Letters

British Airplanes and U. S. Aid

To the Editor:

The delays and difficulties surrounding the Hawker Hunter and Supermarine Swift mentioned in AMERICAN AVIATION of Jan. 17 and which have had much Parliamentary publicity in the U.K. have tended to cloud the issue of their procurement.

Firstly, the U. S. has *not* provided any money for the Swift—the real trouble center. The only aid for this airplane would be the use of machine tools allocated to the manufacturing plant. Only after acceptance by the R.A.F. and the submission of extensive documentary evidence proving complete satisfaction with the product will any allocation be made from the U.S. funds earmarked to aid the British arms budget.

It will be recalled that in Fiscal Year 1954 $85,000,000 was set aside as a direct-aid contribution toward RAF procurement of Hunters, Canberras and V-bombers (Valiant, Vulcan, Victor). These funds are transferred as bulk dollar payments for batches of airplanes on delivery. A pre-determined sum is allocated for each individual airplane, usually between 70% and 75% of its total cost, which is not varied whatever the article finally costs. Payments are, therefore, made by multiplying the airplane's U.S. Aid "price" by the quantity in each batch accepted—these payments are made every few weeks and are going on all the time.

The extra $35,000,000 voted for FY 1955 is as yet untouched—partly, of course, due to belated deliveries.

The OSP funds are direct U.S. purchases and there are guarantee clauses in the contracts, which are placed with U.K. manufacturers through the British Ministry of Supply, so that no payment is made for an article unless it is deemed completely satisfactory.

The U.S. will take title to these airplanes and immediately hand them back to the RAF—or to any other NATO air force of its choosing.

J. H. STEVENS
Hertfordshire, England

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Circle No. 6 on Reader Service Card.

Not Opposed

To the Editor:

Just read the item on page 68 of your February 14 issue, under the heading "Transport Trends." This note is prompted by your comments on the VOR/DME-TACAN controversy. Your last sentence said "favoring TACAN and VORTAC were the Army, Navy, Air Force and Air Transport Association. Opposed were CAA, Aircraft Owners and Pilots Association, and National Business Aircraft Association."

Correction please! I'm sure if you will look into the matter, you will find that neither the CAA, ourselves, or NBAA were opposed to TACAN as such. We were merely opposed to the manner in which the military were (and are) attempting to ram a totally untested and unproved system down our throat, while at the same time beginning the destruction of a system that already is in being and doing very well.

MAX KARANT
Assistant General Manager.
Aircraft Owners and Pilots Association
Washington, D. C.

Books

Airplanes of the World *By Douglas Rolfe and Alexis Dawydoff, published by Simon and Schuster, 630 Fifth Ave., Rockefeller Center, New York 20, N.Y. 312 pages, illustrated. Price: $2.95.*

Rolfe and Dawydoff have assembled more than 1000 drawings of aircraft, all presented in uniform style, and weaved an interesting tale of the growth of the flying machine around the drawings. Their tale starts in 1490 with drawings of the ones that didn't fly, or flew without power, and wends its way through the many eras which have marked aviation's progress. Both readable and useful. . . . WDP

All About Aircraft *By D. M. Desoutter. Published by John de Graff, Inc., 64 West 23 Street, New York 10, N. Y. 474 pp. $5.00.*

Twenty chapters of simplified but useful summaries of such aeronautical subjects as powerplants, fuels, structures, aeromedicine, etc., precede 100 photographs and three-view drawings. The text is written for an audience of intelligent laymen, perhaps students, and attempts to provide at least a significant clue or two to those technical matters which it cannot explore at length. Since it was written in Great Britain, some chapters, notably the one on apprenticeship arrangements and career opportunities, will not be useful to American readers. . . . WK

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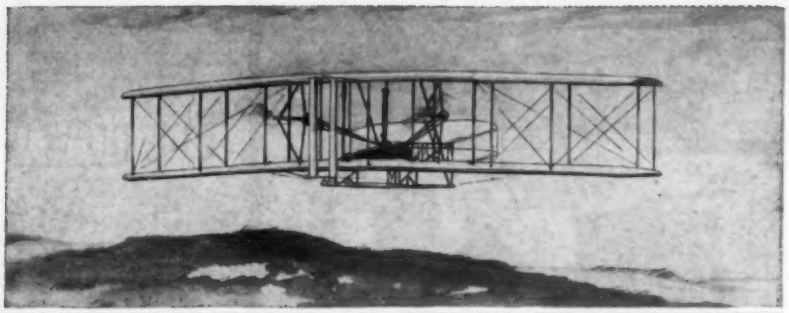

$$F = C\frac{\rho}{2} SV^2$$

IN 1903, when the Wright Brothers were constructing the first successful powered airplane, there were data available on the forces on flat plates held at various angles in the wind. The problem of maintaining equilibrium presented the greatest difficulty of solution. The Wright Brothers had to depend on ingenuity, perserverance, courage and a home-made wind tunnel for solutions to their problems.

TODAY, IN 1955, aircraft development and production depend on the scientific skill of highly trained Engineers. During the past 50 years these Engineers have evolved countless formulae, such as the *Force-In-Pounds* equation above, to help provide simple solutions to aeronautical problems which once seemed insurmountable.

IN THE YEARS AHEAD, sub-sonic, trans-sonic and super-sonic problems will give way to hyper-sonic inquiries as new and greater opportunities challenge Aeronautical Engineers. If progress is to be made, new ideas are needed. New formulae must conquer problems of stress, space, loads and high speeds.

TO MEET THIS CHALLENGE, CONVAIR needs more Engineers with ingenuity. To get the job done will require concentrated and creative engineering. CONVAIR has the experience, record of past performance, leadership, determination and facilities to do the job.

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CONVAIR, Eng. Personnel Dept. MM
FORT WORTH, TEXAS

When & Where

Mar. 20-23—Aero Medical Assn. 26th annual mtg., Hotel Statler, Wash., D. C.

Mar. 21-24—Institute of Radio Engineers national convention, Waldorf Astoria Hotel and Kingsbridge Armory, New York City.

Mar. 28-Apr. 1—Ninth Western Metal Exposition, Pan-Pacific Auditorium, Los Angeles.

Mar. 28-Apr. 1—American Society for Metals exposition and congress (including all-day session on aircraft and rocketry sponsored by the American Welding Society), Pan Pacific Auditorium and Ambassador Hotel, Los Angeles.

April 5-7—Radio Technical Commission for Aeronautics Spring Assembly Meeting, Los Angeles.

Apr. 16-20—American Association of Airport Executives annual mtg., El Conquistador Hotel, Tucson, Ariz.

Apr. 18-21—Society of Automotive Engineers, Golden Anniversary aeronautic mtg., aeronautic product forum and aircraft engineering display, Hotel Statler and McAlpin Hotel, New York City.

Apr. 18-22—American Society of Mechanical Engineers, 75th anniversary mtg., Baltimore.

Apr. 21-23—Airline Ground Transportation Association annual convention, Sheraton Palace Hotel, San Francisco.

Apr. 20-22—American Rocket Society spring mtg., Baltimore.

Apr. 24-28—Airport Operators Council annual mtg., Hotel Olympic, Seattle.

Apr. 27-30—American Helicopter Society 11th annual forum, Mayflower Hotel, Washington, D. C.

Apr. 29—Institute of Navigation's eastern regional mtg., Friendship International Airport, Baltimore.

May 2-5—Society of Aeronautical Weight Engineers annual national conference, Hilton Hotel, Fort Worth.

May 3-5—First International Aircraft Mart Exposition, Will Rogers Memorial Coliseum, Fort Worth, Tex.

May 4-6—Fourth International Aviation Trade Show, 69th Regiment Armory, New York City.

May 18-20—California Association of Airport Executives annual convention, Long Beach, Calif.

May 9-11—Institute of Radio Engineers national conference on aeronautical electronics, Biltmore Hotel, Dayton, Ohio.

May 30-June 5—Aviation Writers Association annual convention, Montreal & Toronto.

June 12-17—Society of Automotive Engineers summer mtg., Atlantic City.

June 21-24—Joint mtg. of the Institute of The Aeronautical Sciences and the Royal Aeronautical Society of Great Britain, IAS Building, Los Angeles.

June 21-24—Aviation Distributors and Manufacturers Association mid-year mtg., Breezy Point Lodge, Brainerd, Minn.

June 23-25—Institute of Navigation annual mtg., Air University, Maxwell AFB, Ala.

INTERNATIONAL

Mar. 31-Apr. 1—Symposium on Boundary Layer Effects in Aerodynamics, National Physical Laboratory, Teddington, England.

Apr. 25—International Air Transport Association technical conference, San Juan, P. R.

May 2—IATA composite agency committee mtg., Bermuda.

May 30—Fifth International Air Display, Ypenburg, The Netherlands.

May 31—International Civil Aviation Organization Assembly, ninth session, Montreal.

Allison T40 Turbo-Prop lifts Navy fighter straight up

When the Navy's revolutionary new interceptor — the Convair XFY-1 — takes off and lands, it gets all its lift from its dual rotating propellers which are driven by Allison T40 Turbo-Prop engines.

That means the power package produces greater thrust than the weight of the aircraft for take-off and slightly less thrust than weight for landing. This delicate landing operation requires the engine to deliver positive and dependable power in the exact amount called for by the pilot.

The Allison T40 engine twin power sections deliver a mighty 5850 horsepower for take-off. In level flight the pilot can shut off one power section to efficiently cruise or he can open the throttle wide on both power sections for maximum power and speed.

This VTO fighter was designed to take off and land from a destroyer's fantail or a freighter's deck which means that each ship in a convoy can carry her own defense against attacks for the entire voyage — promising greater safety for these surface craft.

Along with Convair and the U. S. Navy, Allison takes great pride in the spectacular success of this new type aircraft and in the simple accolade — "Well Done."

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AIRTRENDS

Washington, D. C., March 14, 1955

FUTURE MILITARY AIRCRAFT MAY GET a common system of numbering regardless of which service operates them. Air Force and Navy officials are at work updating an earlier proposal for better aircraft designations covering both the alphabetical unit used for job designation (i.e., F for fighter, B for bomber, etc.) and the different approaches used by the three services (i.e., Navy's use of an extra letter to identify manufacturer in the plane model number and use of prefix "A" on fighters).

Proposal calls for Air Force planes getting odd numbers (i.e., F-109, B-67, etc.) and Navy using even numbers. Army planes, which are procured through USAF or Navy, would use designation of procuring agency.

Strong opposition to the plan is coming from the Navy which would be hardest hit by the changes.

GUIDED MISSILE PROGRESS CONTINUES to be a controversial and confused issue. Two views on U. S. progress:

"I can't conceive of Russia being ahead of us in this field because they don't have the machine tools and know how, but nobody knows for sure." —Air Force Secretary Harold Talbott.

"We had better get going" on guided missiles. Using captured German missile experts, Russia has more than a decade of experience in this field and may be ahead of the U. S. in missile development.—Sen. Stuart Symington (D-Mo).

While Talbott told the Senate "early development" of a ballistic missile is "critical to the security of the country," AF Chief of Staff Gen. Nathan Twining disclosed Convair is "just getting going" on the Atlas intercontinental ballistics missile, the first official acknowledgment that the Atlas project exists. Twining described the long range Northrop "Snark" missile as "coming along fine."

BRITAIN'S GUIDED MISSILE PROGRESS is highlighted by the decision to stop producing anti-aircraft guns and step-up missile production. With little fanfare regarding the relative balance of forces, it was disclosed that for the first time the Royal Air Force will get a bigger share of Britain's defense budget than the British Army during fiscal 1955/56.

AIRCRAFT INDUSTRY HAS JOINED the billion-dollar-a-year sales club for the first time since World War II. Boeing topped the billion sales mark in 1954 and moved into the same league with such industrial giants as General Motors, GE, Westinghouse and Ford.

AIR FORCE PLANS TO ACCUMULATE turboprop transport experience have started rolling. First Allison T 56-powered Convair YC-131C was to begin twice-weekly scheduled runs between Kelly AFB, Texas and Andrews AFB, Md., last week. Second turboprop Convair Liner is programmed for similar service between Kelly and the West Coast.

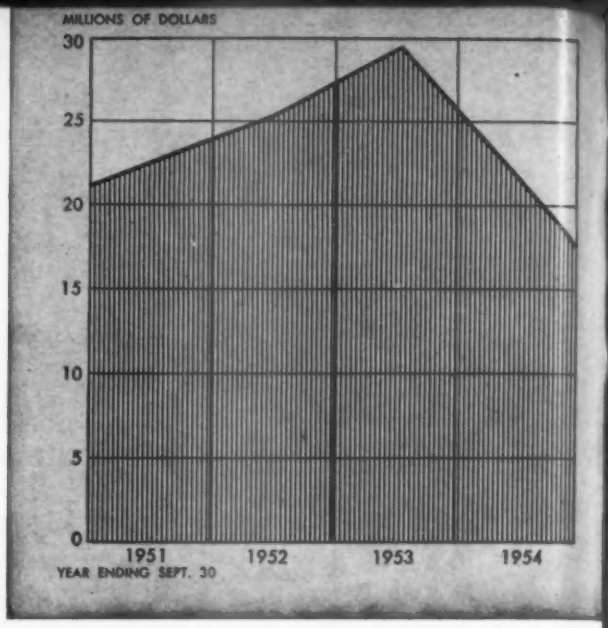
TACTICAL AIR COMMAND IS TAKING ON more stature as its fleet of planes and missiles with nuclear weapon potential grows. In a real emergency TAC's role of ground support and interdiction will probably be spread extensively. Planes backing up the new capacity are the Martin B-57, Douglas B-66, McDonnell F-101, Republic F-84F and the Martin Matador missile, the TM-61.

Airline Advertising - - Going Up

SCHEDULED U. S. AIRLINES have spent an average of better than $2 million a month for advertising during the last four years, with the peak reached in 1953. Airline advertising slipped slightly last year, reflecting the gloom found in first-quarter traffic reports. With traffic on the upswing in 1955, airline advertising is expected to follow.

The biggest part of the airline advertising dollar, approximately two-thirds, goes for space in newspapers and magazines. The remaining third buys radio and television time, counter and window displays, direct mail, etc.

Significantly, U. S. scheduled airlines spend less than half as much to advertise their services as tobacco companies or soap and cosmetic manufacturers do to sell their wares. Even so, the airlines far outstrip aircraft manufacturers. In 1953 and again in 1954, aircraft builders bought advertising space in newspapers and magazines (almost nothing in other media) to the tune of $3.8 million per year. American Airlines alone spends about $4 million a year on advertising.



Aircraft Industry Tax Write-Offs: $400 Million in '54

WHO HAS BENEFITED most from the government's policy of rapid tax write-offs on facilities built in part for national defense?

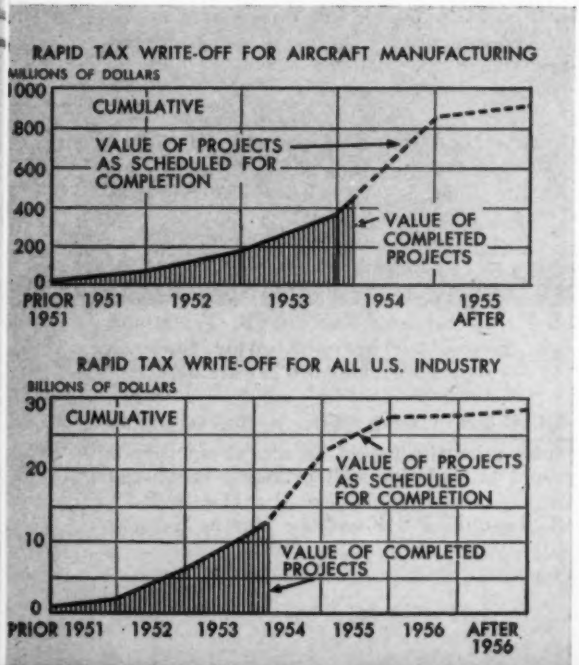
When the present system of tax write-offs was set up in 1950, it was assumed the aircraft industry would be a primary beneficiary. Yet, such evidently was not the case, according to the latest figures from the Office of Defense Mobilization.

By 1957, the government expects to have granted permission for $30 billion in rapid tax write-offs to U. S. industry. Of this amount, the aircraft industry is expected to get $1.3 billion, or 4.3 per cent.

Other industries are taking a much larger share of the rapid tax write-off pie. Chemicals and related products are expected to get 10 per cent of the $30 billion total. Steel mills (including rolling mills) probably will take nine per cent; petroleum refining, 6.5 per cent.

Last year the aircraft industry used a little more than $400 million worth of rapid tax write-offs and by the end of 1954 had used about two-thirds of the $1.3 billion total the industry is expected to reach by 1957.

Of the aircraft industry's rapid tax write-offs so far used, it is worth noting that 66 per cent of the money was accounted for by land purchases, construction and overhead, and only 34 per cent by machinery and equipment. In most other industries the figures were reversed, with machinery and equipment accounting for the bulk of the spending.



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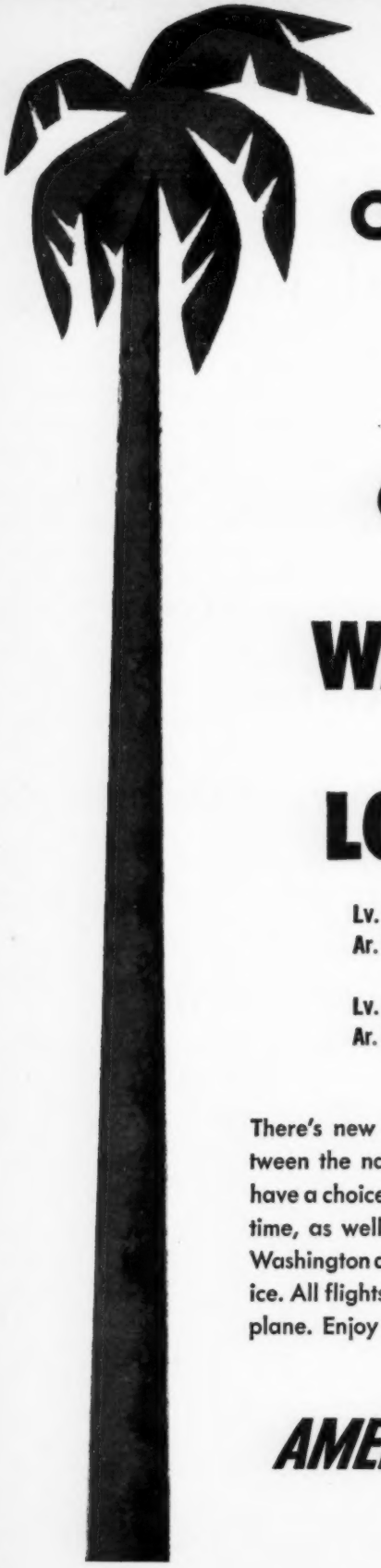

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BUSINESS

Good Design Also Means Profits

JUST HOW FAR a good airplane design can go during its evolution was illustrated recently by two of the industry's leaders. Lockheed Aircraft revealed that it has sold more than $1 billion worth of the Constellation series, a total of about 650 airplanes. Over a dozen models have thus far been designed since the first flight of the 049 in 1943, at a cost of some 1 million engineering man-hours. Production for airline deliveries will proceed at a one-a-week rate throughout 1955; military production will continue through 1956.

Douglas Aircraft Co. announced at the same time that it has delivered 2500 AD "Skyraiders," a single-engine attack bomber, to the Navy during the past 10 years. In that period 49 versions were designed. Production is scheduled into 1957.

Such production efforts are made possible to a considerable extent by subcontracting. The importance of this aspect of the industry was highlighted recently by a flurry of subcontracts on late-model fighters: Chance Vought will supply North American Aviation with aft fuselage sections for its F-100 Super Sabre. Northrop will build aft center fuselage sections for the McDonnell F-101A Voodoo. Rudder assemblies, wing tips, and an assortment of other honeycomb sections will be provided by the Narmco Manufacturing Co. of San Diego for Convair's F-102. Beech Aircraft Corp. will build droppable fuel tanks for Republic Aviation's F-84F and RF-84F.

PROFIT & LOSS

Firm	Period	'54 Net	'53 Net	Earnings per Common Share 1954	1953
All Amer. Engrg.	Yr. 12/31	80,834	68,502	....	...
Capital Airl.	Yr. 12/31	1,746,759	1,652,289	2.10	2.00
Douglas	Yr. 11/30	36,156,861	18,586,305	14.70	7.73
Curtiss-Wr..	Yr. 12/31	19,377,279	11,402,791	2.50	1.36
Hiller Heli.	Yr. 12/31	(97,709)	247,637	....	...
Rohr Airc.	6 m. 1/31	1,482,851	2,603,275	1.64	2.22
Jack & Heintz	Yr. 12/31	1,803,460	1,695,936	1.98	1.87
National Qtr.	12/31	275,459	3,011,347*	.27	...
(* All from sale of aircraft; operating loss of $57,134.)					
Minneapolis-Honeywell	Yr. 12/31	15,345,203	10,329,825	4.84	3.31
Ryan	Yr. 10/31	1,961,667	1,475,446	5.15	3.80
Solar	9 m. 1/31	1,171,600	1,189,000	1.74	1.96
Thompson Prds.	Yr. 12/31	11,678,645	9,652,923	4.25	3.56

DIVIDENDS

Firm	Period	Amount	Payable	Record Date
American Airlines	..	20¢	3/21	¾
Amer. Bosch Arma	..	25¢	4/15	3/15
Amer. Bosch Arma pf A&B	Q.	1.25	4/1	3/15
Amer. Bosch Arma 5½% pf	Q.	68¾¢	4/1	3/15
Bendix Avia.	Q.	50¢	3/31	¾
Chance Vought	..	40¢	3/28	3/10
Curtiss-Wright	..	35¢	3/28	3/7
Curtiss-Wright Cl A	Q.	50¢	3/28	3/7
Curtiss-Wright Cl A	Q.	50¢	6/28	6/7
Curtiss-Wright Cl A	Q.	50¢	9/28	9/7
Curtiss-Wright Cl A	Q.	50¢	12/28	12/7
Garret Corp.	..	40¢	3/21	3/1
North American Aviation	Q.	75¢	4/6	3/16
Piper	..	5¢	3/15	3/1
Thompson Products	..	35¢	3/15	3/3
Thompson Products	..	1.00	3/15	3/3

OTHER CONTRACTS

• **Western Electric Co., Inc.,** has been named prime contractor on the construction of the Distant Early Warning radar line in Canada. The USAF has set up a Joint Project Office in New York City for the program.

• **General Electric Co.** has received a $2 million order from the Navy for MA-1 compass-controlled directional gyro compass systems.

• **Seaboard and Western Airlines** will airlift freight and personnel to Western Europe for the military, for six months beginning April 1. The Super Constellation airlift will amount to more than $3.5 million.

• **Lear, Inc.** has received a USAF contract to provide MB-2 autopilots for Republic F-84F and RF-84F's at a price of almost $6.7 million.

• **Bendix Aviation Corp.** has announced that some $2 million worth of communications and navigation equipment has been purchased for installation in Vickers Viscounts. The 90 Viscounts involved will be operated by Capital Airlines and six foreign carriers.

FACILITIES

• **General Electric Co.** jet engine plants in Evendale, O., and Lynn, Mass., are due for a $40 million expansion during the next five years. The sum, which will be spent by G.E., is in addition to military spending on the facilities.

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HIGHEST PERFORMANCE and DEPENDABILITY Throughout the Years...

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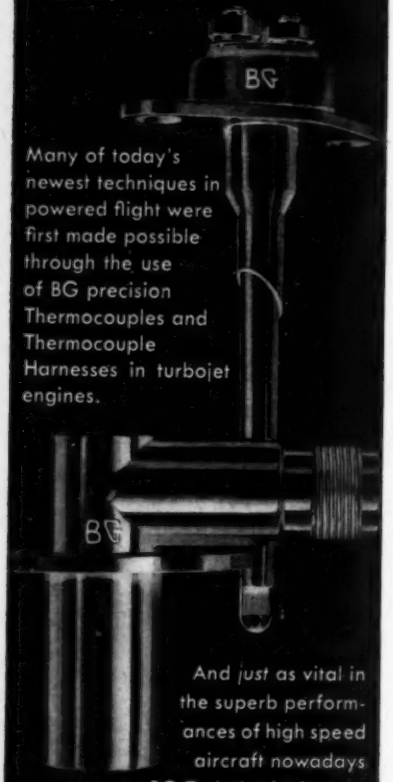
1955 marks the thirty-ninth consecutive year in which BG quality has led the field.



Many of today's newest techniques in powered flight were first made possible through the use of BG precision Thermocouples and Thermocouple Harnesses in turbojet engines.

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Industry Spotlight

• Ryan Aeronautical Co. has taken delivery on the Rolls-Royce Avon engine for its vertical take-off fighter, the delta wing Type 69 which reportedly carries the USAF designation XF-109. Plane is said to gross about 8,000 pounds and, powered by the Avon RA28 with 10,000 pounds thrust, would be a high performance plane. Avon engine was selected because of its high weight/thrust ratio: 3.44 lb./lb. thrust.

• Designation of the Piasecki H-16 with two Allison T56's will be YH-16B. The prototype-geared-turbine version, the YH-16A using two Allison T38's, is scheduled to make its first flight in April. The YH-16 now flying has two Pratt & Whitney R-2180 engines, an engine no longer in production.

• Automatic flap control for the Convair 340 is being developed by Lear, Inc. and could be adopted for other airplanes in a very short time. Lear development is aimed at eliminating type accidents brought on by improper flap operation and would provide automatic operation based on aircraft speed and attitude. Company officials claim recent development in magnetic amplifiers and magnetic and synchro type transducers assure reliability which was previously unattainable.

• Non-stop flight of Convair's turboprop powered R3Y Tradewind from San Diego, Calif., to Patuxent Naval Air Station, Md., is another signficant step in Navy's program to drive home the Navy's big strides in air logistics and advances in water-based planes. The 2400 mile flight was made in six hours at 27,000 feet altitude averaging 403 miles per hour. Pilot was Convair's Don Germeraad.

• Newest thing in hangars is tepee-shaped. It houses Convair's XFY-1 "Pogo" at Brown Field Naval Auxiliary Air Station near San Diego, Calif. A tractor maneuvers the plane into position, and the hangar enfolds it like the halves of a clamshell. Inner wall of the hangar has triple-deck work platform, permitting easy access to all parts of the plane.

• First official disclosure that Douglas is building the turboprop powered C-133 came in the company's newly released annual report. There is still no word on the even bigger C-132 underway at Douglas. Other transport highlights at Douglas: Disclosure that more than 400 C-124's have been produced, announcement that 77% of the ton-miles flown by MATS in 1954 were flown in Douglas aircraft, and assembly line shift at the Santa-Monica plant which will see six models of the DC-6 and DC-7 series aircraft built on the same production line.

• Attempts are being made to recover the wreckage of the North American F-100 which plunged into the Pacific Ocean after pilot George Smith bailed out at 10,000 feet altitude. Plane was one incorporating the modifications which resulted following the grounding of the Super Sabre last year. Smith escaped without serious injury but there has been no indication of the type trouble he experienced or if it related to the earlier problem.

• First production B-52 from the second source plant at Boeing-Wichita is slated to roll-out in early 1956, according to industry reports. This would be 18 months after the first flight of the first production B-52A at Boeing-Settle.

• Lear, Inc.'s L-10 autopilot, designed for supersonic aircraft, is now undergoing flight and laboratory tests. Meanwhile Lear has received a $6.6 million USAF contract for MB-2 autopilots for the Republic F-84F and RF-84F.

• CAB has called for industry comments on a proposal to replace existing aircraft identification markings on the wings of aircraft and undersides of helicopters with larger markings on the sides or vertical surfaces of aircraft and fuselage sides of helicopters. Minimum height of markings would be 12 inches. Proposal also calls for removal of registration marks prior to aircraft delivery to foreign nationals.

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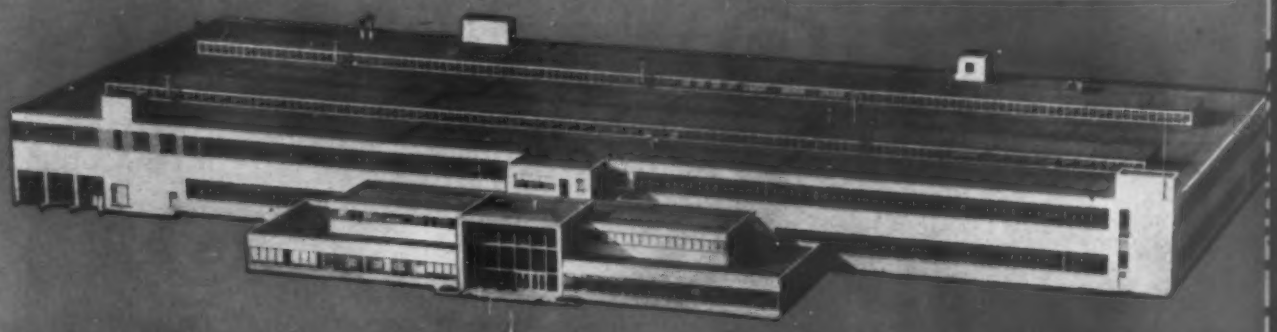
To serve you better...

The Bendix plant at Utica, N. Y., contains more than 221,000 square feet of floor space and has acquired a deserved reputation for "getting things done". Witness the fact that it was the first . . . and still is the only . . . source of self-contained fuel-air combustion starters of a qualified design on a production basis.



Utica DIVISION OF Bendix AVIATION CORPORATION

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We are convinced that this move is going to enable Bendix to serve your interests even better than in the past.

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Utica DIVISION — Bendix AVIATION CORPORATION

Building Boeing airplanes is a nation-wide project

America's global jet bombers – B-52s like the one shown above–are rolling off Boeing's production lines in steady numbers. Although this B-52 production is centered in Seattle, it incorporates the efforts of businesses and workers located from coast to coast, and from Canada to Mexico.

At latest count, more than 5,000 firms were supplying material, equipment or service for aircraft built by Boeing's Seattle Division. Of these, some 4,000 are small businesses having 500 employees or less.

Similar emphasis on subcontracting is the rule at Boeing's Wichita Division. Here Boeing builds the Strategic Air Command's front-line nuclear weapons carrier, the six-jet B-47, and is tooling up for B-52 second-source production. No fewer than 3,588 individual companies, more than 75% of them small businesses, share the work of this Division.

Out of every Air Force dollar contracted to Boeing, approximately 65 cents is passed on by Boeing to its subcontractors and suppliers. The remainder–about 35 cents out of each dollar–is retained by Boeing to cover all items in connection with its own in-plant operations. Boeing airplanes are truly nation-wide projects.

Maintaining a coast-to-coast subcontracting and supply network is a vital force in the nation's defense program. It assures a broad base for the production of aircraft needed for the foreseeable future. And, in time of emergency, it would provide trained, equipped and experienced supply sources capable of rapid expansion.

BOEING

AMERICAN AVIATION

Personal View

By WAYNE W. PARRISH

Here's Good News

CAN U. S. international flag carriers operate without mail subsidy? Eight years ago it was taken for granted that the international routes would have to be propped up with subsidy far into the future and perhaps forever.

But there is startling news afoot today. It is now revealed that Trans World Airlines' international routes have actually been subsidy-free since July 1, 1952. Beginning July 1 of this year, Pan American's Pacific routes are scheduled to be free of subsidy. And Northwest Airlines believes it will be out of the subsidy class before too long.

The CAB has just issued a special interim report on subsidy separation showing that it not only overestimated subsidy requirements for the current fiscal year, but that the new fiscal year starting July 1 will show subsidy on international routes reduced to the tune of many millions of dollars.

It is too early, perhaps, to say that the way is now clear for all international routes to get off the subsidy category. But at least a vital milestone has been reached and the TWA achievement has been notably spectacular. In view of the general acceptance of virtually permanent continuing subsidy internationally only a few years ago, we hope CAB and the airlines take full advantage of current achievements to publicize the fact that subsidy is not a necessary adjunct to international operations in all cases. It may well be that the ratio of subsidy internationally can be further reduced to as low as it now is for the domestic trunks.

Important Birthday

FEW PEOPLE even in the aviation industry probably realize that the National Advisory Committee for Aeronautics was one of the earliest aviation actvities in the United States. It was created by Congress in 1915 and on April 14 it celebrates its 40th birthday. In a government and and activity fraught with change, it is noteworthy that the first person on NACA's payroll, John Victory, is executive secretary with four decades of continuous service. Dr. Jerome Hunsacker, the present chairman, wrote the first NACA report. It is regrettable that the late Dr. George Lewis with whom NACA was so indelibly linked through the years as director, could not have lived to see the 40th anniversary. It is an important historical milestone in aviation and we hope the industry will take proper cognizance of it. Life and the time being what they are, many old-timers who have played vital roles in creating and developing America's leading role in flight may not be around to witness the 50th birthday in 1965.

The Helio 'Courier'

WE HAVE FELT for a long time that there was a definite place in the aviation scene for a stall-proof, slow flight, private airplane. When the Helioplane was designed after the war by Lynn Bollinger and Otto Koppen, we thought the answer had been found. But the Korean war upset production plans and the Helioplane faded into the background.

Now it's to be in the limelight again. As reported elsewhere in this issue, the Helio 4-place "Courier" is being built in Kansas, long the center of civil aircraft production in the U.S., by a contract manufacturing source with ample means and facilities. Without any great fanfare or promises of miracles, this versatile vehicle, which can fly at under 30 miles per hour and take off and land in less than 75 yards, is to be built in sufficient quantity to assure full demonstration of its usefulness as an intermediate airplane. It may well give the helicopter a good run for its money. We're glad the Bollinger-Koppen project is very much alive.

Man the Pumps

International organizations such as ICAO, IATA, and the United Nations seem to go in for double dome, high-falutin' words cooked up by the academic boys and Ph.D. bureaucrats. So when a release came in the mails the other day with a heading "Corrigendum" we thought it was something dreamed up by an international egghead. But we were wrong. The release came from the Radio Technical Commission for Aeronautics in Washington. Having looked up "corrigendum" in the dictionary we can allay any fears. Simply means an error to be corrected in a manuscript or paper, and if we could only understand the technical wordage of what's to be corrected we'd be in fine shape. Guess we should have completed school after all.

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

We're for never blowing bubbles

THE BUBBLE TYPE CANOPY on the new Martin B-57B light bomber had to be safely pressurized at altitudes of 8 miles and higher. Ordinary inflatable seals between the bubble and cockpit might blow out from the effect of high pressure inside the canopy and low pressure on the outside.

B. F. Goodrich engineers had a ready-made answer to the problem—their inflatable strip seal. It has a U-shaped solid rubber base and a rubberized fabric diaphragm nested inside the base. When inflated, this diaphragm simply *lifts* to seal effectively. Low inflation pressure gives full expansion with very little or no stretch. Of course, less stretch means less strain. It works like blowing up a paper bag so that dangerous stretching, like blowing up a toy balloon, is eliminated.

The new inflatable strip seal works almost instantly. Even at minus 65°, it inflates with approximately the same pressure that ordinary seals needed at room temperature. There are other advantages. It fits around complex curves. It seals and unseals quickly. Sliding wear and scuffing are minimized because of high clearance when seal is deflated.

The new B. F. Goodrich seal is now in use on more than a dozen makes of planes, including latest jet fighters and bombers like the F-100 and B-57.

Other B. F. Goodrich products for aviation are tires, wheels, brakes; De-Icers; heated rubber; Pressure Sealing Zippers; Avtrim; fuel cells; Rivnuts; hose; other accessories. *The B. F. Goodrich Company, Aeronautical Sales, Akron, Ohio.*

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ESTABLISHED JUNE 1, 1937

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American Aviation

VOL. 18, NO. 21

BOEING WINS JET TANKER SWEEPSTAKES

Lockheed Gets Phase I Contract for Its Proposal

By ROBERT M. LOBELSON

BOEING COPPED the blue ribbon in the Air Force's jet tanker sweepstakes last week. Lockheed placed and Douglas finished out of the money. Convair's entry had been scratched several months earlier.

ALLEN

Air Force Secretary Harold E. Talbott, who made the announcement, said "establishment of a second source would not substantially speed up deliveries of jet tankers and . . . would be prohibitive in cost." He then went on to further announce:

• **Placement of** "substantial additional orders" for the Boeing KC-135, which USAF first ordered last fall.

• **Award of a Phase I** (design and development engineering) contract with Lockheed for its proposal because the Lockheed plane is "a technically advanced tanker of great interest."

• **The USAF probably will** buy "one or more prototypes" from Lockheed as soon as Phase I engineering progress warrants it.

From this it is clear that Boeing, whose KC-135 is an enlarged version of the 707 tanker-transport demonstrator now flying, may have moved to the front as the American supplier of jet transports to the world's airlines. And the Seattle company, as a result of the new KC-135 contract, probably is the firm holding the largest backlog of defense business in the country.

Talbott says Air Force requirements must be filled before Boeing can attempt to fill commercial orders, which now are expected. However, Boeing historically has had little trouble meeting military production schedules and undoubtedly will go all out to speed tanker output so that jet transports can be built on the same production line at Renton, Wash. If Boeing meets USAF scheduling requirement for a high-speed refueler for the B-52 and B-47 jet bombers and McDonnell F-101 and Republic F-84F fighters, there is little question but what Talbott will approve concurrent commercial production.

• **Wellwood E. Beall, Boeing's senior vice president,** clarified Boeing's commercial intentions just after the AF contract was announced. Said Beall:

"For some time we have hoped to be in a position to offer commercial jet transport airplanes for sale as soon as our obligation to the USAF for production of KC-135 airplanes could be established, permitting us to quote firm deliveries on commercial aircraft.

"We want to sell jet transports commercially, but a final decision must await formalization of our contracts with the USAF."

Lockheed will not be obligated to meet production schedules as a result of its award. Actually, USAF financing of Lockheed research and the resulting order for a few prototypes (probably to be built at Marietta, Ga.) may serve to put the Burbank company in a better competitive position to seek commercial orders.

• **Lockheed's proposal,** it is understood, features either 15,000-pound-thrust Pratt & Whitney J75 or GE J79 turbojets; a high wing and truckbed-height loading. While designed primarily as a tanker, it nevertheless may become a leading competitor to the Douglas XC-132 turboprop logistic cargo plane now under development. The XC-132, to be powered by four P&W 15,000-hp T57's, will haul 80 tons of cargo across any ocean.

Douglas, the only one of the three companies (Convair's pod entry was eliminated) which did not get any USAF tanker award, cannot be eliminated as a jet transport builder. While Douglas fought hard to win the tanker competition, the Santa Monica company undoubtedly will refuse to surrender its role as a leading commercial plane

BOEING 707, the new tanker's predecessor, was completed at Renton plant last year.

builder and go ahead with the DC-8.

As Donald W. Douglas, president of the company, put it before the tanker winner was announced: "As the state of the art progresses and powerplant improvements become available, our (jet transport) designs are being modified. We are confident that when the Douglas jet transport is placed on the market, it will be the most modern in the field."

• **Talbott said** the total value of orders for the KC-135 will approximate $700 million (including the $240 million for the first 29 ordered last fall) but emphasized that these orders would be placed over an extended period. Original plans called for the 29 KC-135's with fiscal 1955 money and an additional 59 with 1956 funds, for a total of 88. First is slated for delivery in October 1956.

GROSS

Now, it is reported, the plan is to order the originally programmed 59 with funds to be appropriated by June 30 and an additional batch with 1956 money, plus further orders financed by fiscal 1957 and possibly 1958 appropriations.

However, **Talbott's $700 million** figure is understood to cover only the airframe of the jet tanker. Total cost of the planes (including such Government-Furnished-Parts as engines and electronics) is placed in the neighborhood of $1.5 billion. The total order, probably scheduled for completion by 1960 when all 11 B-52 bomber wings will be in existence, is expected to be for about 300 KC-135's, or nearly one KC-135 for each B-52.

One of the conditions in the Boeing contract is that there will be a maximum of subcontracting to other manufacturers throughout the country. While this undoubtedly will be done (Boeing-Wichita, for example, subcontracts 60% of its B-47), it is logical to expect that five companies already picked by Boeing to participate in KC-135 output will get increased orders. Included are:

• **Rohr Aircraft Corp.,** Riverside, Calif., building engine struts and pods and horizontal stabilizer and elevator assemblies.

• **Twin Coach Co.'s** Aircraft Division, Buffalo, supplying vertical fin and rudder units.

• **Bendix Aviation Corp.,** South Bend, Ind., scheduled to produce main landing gear units.

• **Ryan Aeronautical Co.,** San Diego, slated to turn out aft fuselage sections and stabilizer torque box structures.

• **Menasco Manufacturing Co.,** Burbank, manufacturing nose gear assemblies.

In addition, Pratt & Whitney and Ford Aircraft Engine Division, Chicago, the two manufacturers of the 10,000-pound-thrust J57 used in the KC-135, will both get a big chunk of business out of the new award. A 300-plane order for KC-135's would mean 1200 J57's, plus about 50% spares, for a total of 1800 of the P&W designed gas turbines. Latest price reported for the J57 was $250,000, indicating that Ford and P&W will share in a USAF order amounting to about $450 million for the jet tanker alone.

Pentagon sources indicate that while Talbott said the USAF had decided to standardize on the KC-135, the airplane just ordered differs in several respects (notably, it is somewhat larger) from the craft contracted for last August. And that earlier KC-135, in turn, will be much larger than the existing 707, which grosses 190,000 pounds. The KC-135 purchased in August may weigh in at as much as 250,000 pounds; the newest version even more.

There is not much doubt that the follow-on order for the tanker puts Boeing at the top of the industry list as far as business on the books goes. The Seattle company began 1954 with a backlog of $2,357,000,000 and has not announced a backlog figure since.

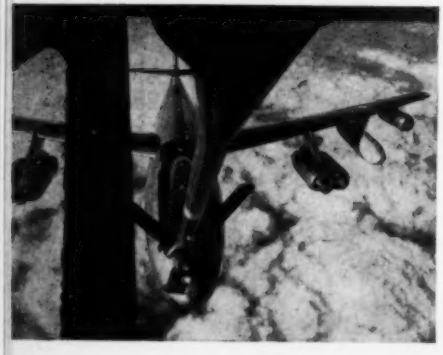
• **Based on the $771.5 million** in sales recorded for the first nine months, Boeing undoubtedly sold more than $1 billion for all of 1954. (The 1954 annual report is expected in mid-March.) This would bring the backlog as 1955 began to about $1.357 billion if no new business had been acquired during the year. But, in addition to the $240 million KC-135 contract in August, Boeing also booked more than $300 million for B-52D's in October and several other contracts—enough so that Boeing's backlog on Dec. 31, 1954 was about $2.2 billion. The new KC-135 order will boost that considerably.

(Douglas reported a backlog of $2.035 billion as of Dec. 1, 1954 and General Motors Corp. $1.1 billion on Dec. 31, a 67% decrease since Jan. 1, 1953. GM for a long time was the leading holder of defense contracts. No other aircraft company is close to Douglas or Boeing in backlogs, although several still top the billion-dollar mark.)

Thus, Boeing's jet tanker may well prove to be the forerunner of a commercial jet transport. And when airlines order a civil passenger version of the tanker, the USAF may find that it, too, needs a fast plane capable of hauling priority passengers and freight. • • •

BOEING 707 IS NOW undergoing rigorous flight-testing program.

IN FLIGHT refueling for which new tanker is needed.

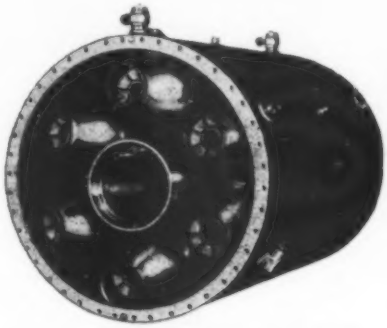


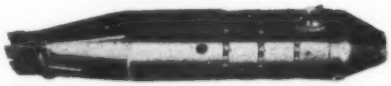
Allison's T56 Now Ready for Commercial Use

BY WILLIAM D. PERREAULT

ALLISON'S MILITARY T56 turboprop engine has now been declassified and the General Motors subsidiary is pressing its claims for commercial business with the newly released facts and figures. Recent developments emphasize this:

• **Allison has provided** the airlines and manufacturers with detailed reports on civil models of the T56, known as the 501-D10 and 501-D12 engines, and established guaranteed overhaul periods, warranties, etc.

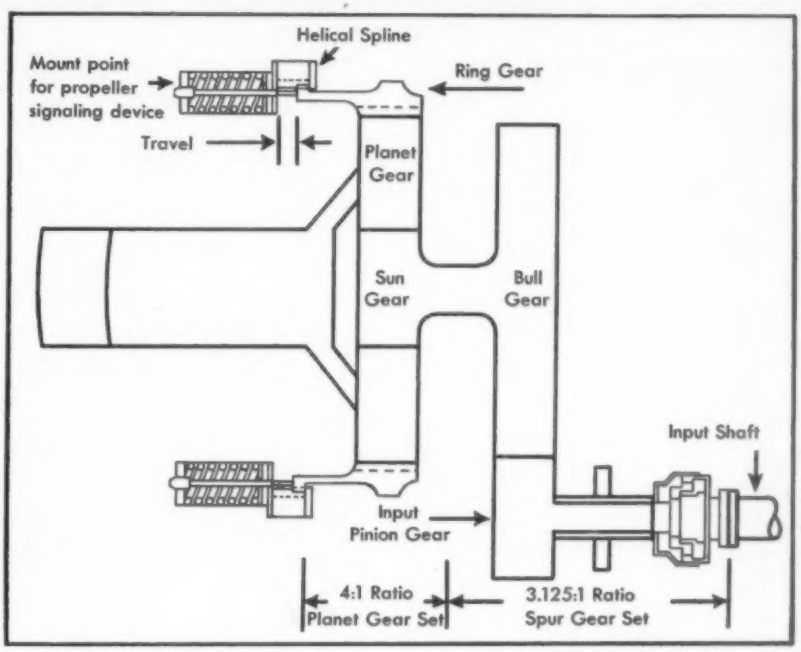




Combuster has six stainless steel combustion liners inside steel shell.

• **CAA officials witnessed** the 150 hour military type tests on the T56 and are simply awaiting USAF approval and minor paper work prior to issuing a commercial certificate. This is likely within 90 days.

• **Convair, Lockheed and Douglas** have submitted transport designs to American Airlines based on use of the Allison turboprop. The Douglas design is based solely on the T56 while the Convair and Lockheed proposals use it as one of several alternatives.



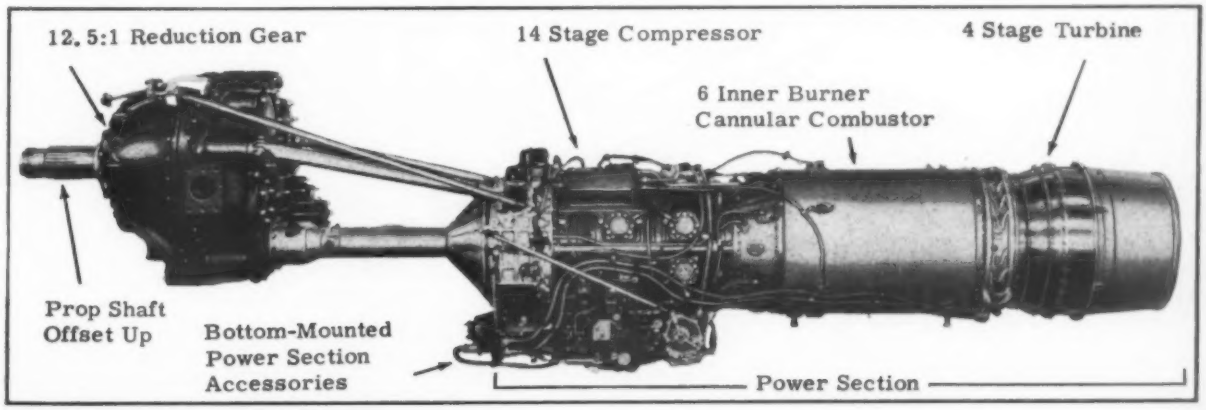
Major safety device in the T56 (501-D10) is the negative torque signal device. It moves prop toward high pitch when torque on the engine shaft reverses, as during power failure.

In letters to the airline presidents, Allison General Manager E. B. Newill has stated: "Allison fully expects to become competitive in every sense of the word with the Model 501 engine and matching propellers, and is now preparing an organization capable of devoting exclusive attention to the successful development of the 501 commercial engine and propeller. The performance guarantees, service life warranties, and assignment of technical personnel will, at the appropriate time, equal those of any of the companies with which the airlines have been traditionally associated."

Allison's proposal to the airlines and manufacturers is flexible. They can provide the basic 501-D10 engine, civil counterpart of the T56 rated at 3750 horsepower, or they can provide the same engine but with operating limitations making it a lower power, longer-life engine. Guarantees and warranties will be based accordingly.

• **With full power rating,** which calls for turbine inlet temperatures up to 1780° Fahrenheit, Allison will guarantee 400 hours between engine overhaul. This assumes a climb rating of 92% full power and cruise at 80%—providing climb power of 3105 equivalent shaft horsepower and cruise power of 2700 eshp.

Allison's 3750 horsepower 501-D10 turboprop, scheduled for CAA certification in about 90 days.



By cutting down maximum turbine inlet temperature to lower values throughout all power regimes, the 501-D12 engine is created. It is based on keeping take-off turbine inlet temperature under 1625°F (3015 eshp), climb temperature to 1515° (2505 eshp.) and cruise (which is limited to 72% power), to 1395°F (1940 eshp.).

• **The 501-D12 engine,** using the lower operating temperatures and power, comes out ahead in reliability and service life. Guaranteed overhaul time becomes 600 hours and warranties are scheduled accordingly. But the lower temperature cuts efficiency and fuel consumption goes up appreciably. For the cruise condition, the 501-D10 operates at 80% power and has a SFC of 0.589 lbs./hr./eshp. On the D12, operating at 72% power in cruise, its 0.673.

Both of these models are the same basic engine with operating limitations governing power and designation. They weigh 1630 pounds each, minus propeller, and are 145 inches in length, 27 inches wide, and 39 inches high. Power to weight ratio is 2.3:1.

The accompanying photos are the first internal photos of the T56 engine ever released. Some of the general data on engine design features incorporated in the same status report to the airframe manufacturers and airlines:

• **Reduction gear assembly:** Weighing approximately 450 pounds, the reduction gear assembly is driven through a 28-inch extension shaft (see photo) from the power section. Gear reduction ratio is 12.5:1 with the engine rpm 13,820 and propeller rpm 1106. Reduction is accomplished in two stages, the first a spur gear set with speed ratio of 3.125:1 and the second a planetary gear set of 4.0:1 ratio.

• **Compressor:** Designed to handle more than 30 pounds of air per second, the compressor is a 14 stage unit. Compression ratio is over 9:1, perhaps as high as a single spool compressor design is likely to be. The wheels, blades, casings and vanes are of steel but titanium is being evaluated.

• **Combuster:** Six stainless steel combustion liners, housed in a one piece steel outer shell, make up the combuster. Fuel nozzles are provided in the domes of the liners and igniter plugs are located in two diametrically located chambers. Crossover tubes carry the flames for starting.

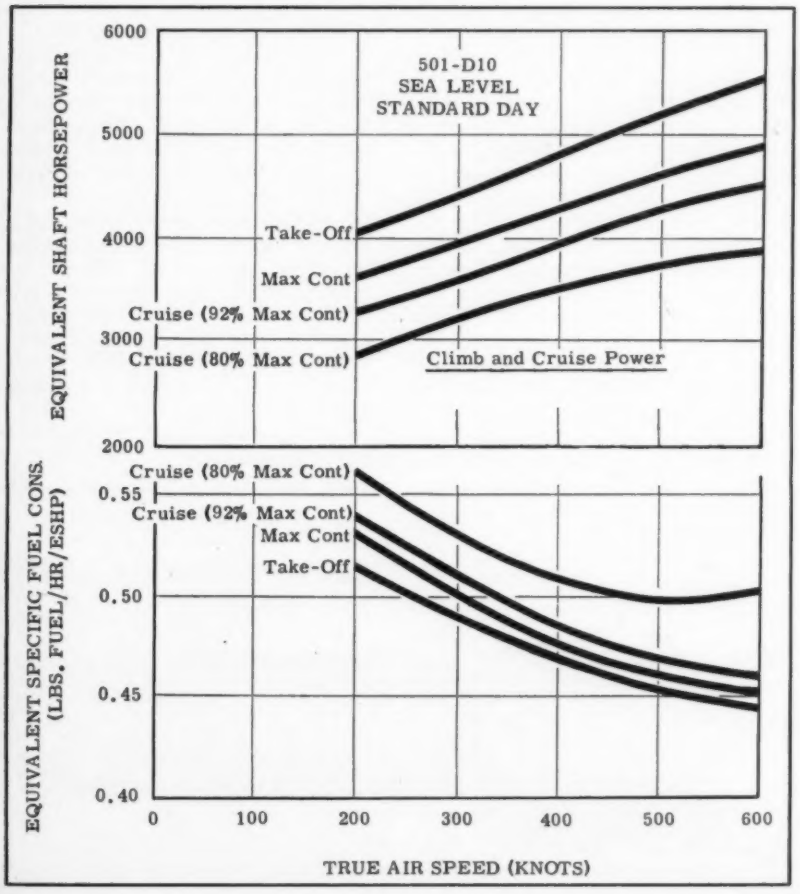
Fourteen stage compressor in the 501-D10 provides over 9:1 compression ratio.

• **Turbine Assembly:** The four stage turbine is splined to the turbine rotor shaft. A turbine spacer disc locates wheels along the shaft and wheel rim cooling is provided by air flow through holes in the spacers and wheel.

Four stage turbine uses stainless steel wheels, three stages with cast GMR 235 blades and final stage with forged S-816 blades.

• **Negative torque signal:** Designed to provide a signal to increase propeller pitch as necessary to limit negative propeller shaft torque, the NTS operates when 275 hp negative torque is applied to the ring gear (*see drawing*). This moves the ring gear forward against a calibrated spring force generated by helical splines resisting the rotation of the ring gear. Through dual operating rods in the gear box nose, the motion is used to actuate the propeller pitch change mechanism until the negative torque signal is reduced to the preset value.

Power and fuel consumption curves for the 501-D10 engine tell the final story.



The NACA Dollar: Where It Goes and Why

AT VARIOUS TIMES during the last few years, and especially during periods when Congress was studying the annual Presidential budget message, there have been public statements warning that the U. S. is asking for trouble if it neglects aeronautical research and development.

Many individuals and groups in aviation, notably DeWitt C. Ramsey, president of the Aircraft Industries Association, and top officials of the National Advisory Committee for Aeronautics have made comments along that line.

This year is no different. In NACA's fortieth annual report to the President and Congress, submitted late last month, Dr. Jerome C. Hunsaker, chairman of the governmental aircraft research agency, declared:

• **"The current trend** toward leveling off expenditures for scientific research in aeronautics is forcing hard decisions to slow down or to defer indefinitely research projects essential to the timely development of new weapons," and added:

• **"It is now wise** to accelerate scientific progress. In the long run, scientific research is the best insurance that there will be 'value received' from the country's whole aircraft program."

Some in the aircraft industry point out that statements like Hunsaker's are made primarily to influence Congress to grant all of the military and NACA requests for research and development money. And there is no question that the statements are made with just such a purpose in mind.

But not even the cynics question their accuracy of the comments. And it is easy enough to see why.

Sweptwing research . . .

In the 11 fiscal years beginning in 1945 and ending this coming June 30, NACA has received appropriations totaling $440,394,873 for salaries and expenses and an additional $150,468,800 for construction and equipment (including $75 million for unitary wind tunnels, and NACA is just the house-

Rocket fuel tank locations . . .

keeping agency for these tunnels). In addition, for fiscal 1956, NACA is seeking $63.5 million for salaries and $13 million for construction. If the agency gets the full amount, it will have received in 12 years a grand total of $667,363,673 or just over $4 from every man, woman, and child in the U. S. at present (162 million).

For that $4, or about 35 cents each a year for 12 years, America's citizenry has apparently gotten its money's worth from NACA. Without the investment in research at NACA's laboratories at Lewis in Cleveland, Ames at Moffett Field, Calif., and Langley at Langley Field, Va., many of the improvements in today's aircraft (and possibly even the aircraft with present performance) might not be in existence. And without the studies that the agency is now carrying on, it is unlikely that the Air

VTO transitions . . .

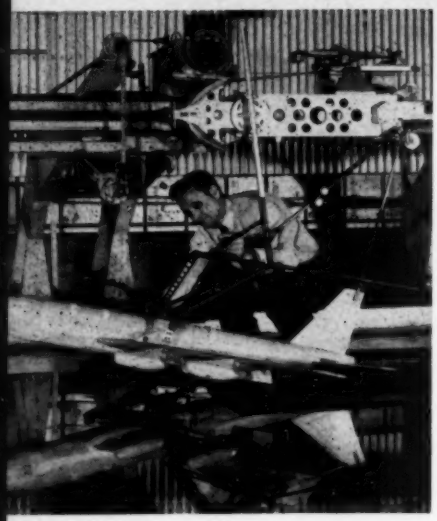
Force and Navy planes of tomorrow will be as effective as they could be. Examples:

• **In 1942,** just after World War II began, NACA began research on the "all-flying" tail, a device designed to give pilots a better "feel" of the airplane. Before Korea, the "all-flying" tail had been incorporated in the North American F-86E Sabre and has since been used on many other fighters.

• **In 1943,** models of the Boeing B-29 were "ditched" in a test tank at Langley to ascertain the best way of landing a multi-engine airplane on the water to save lives. Similar studies are now under way with models of the Boeing 707 (predecessor of the KC-135 jet tanker) so that pilots of jet tankers and commercial transports will know how to handle the situation if they are forced down at sea.

• **Back around 1949,** NACA began preliminary studies of an airplane capable of taking off and landing ver-

YEAR	SAL. & EXPENSES	CONSTR. & EQUI
45	$26,557,330	$14,385,000
46	24,014,393	....
47	27,615,000	3,098,000
48	33,570,900	9,879,000
49	38,652,000	7,857,000
50	43,000,000	77,722,800
51	45,750,000	2,318,000
52	50,650,900	6,650,000
53	48,586,100	16,700,000
54	51,000,000	7,239,000
55	51,000,000	4,620,000
	440,394,823	150,468,800
Requested 56	63,500,000	13,000,000
Total	503,894,823	163,468,000



Transport ditching . . .

tically. After this was proved possible, construction was authorized of two experimental vertical take-off fighters, the Lockheed XFV-1 and the Convair XFY-1.

• **About the same time,** research was conducted on the aerodynamic and hydrodynamic characteristics of flying-boat hulls as they are affected by hull dimensions and hull shape. Whereas conventional flying boats had a length-beam ratio of six, NACA studied hulls with L-B ratios of 15. The result: Martin's piston P5M Marlin, the Martin jet XP6M-1 Seamaster, and the Convair turboprop R3Y Tradewind.

• **By 1951,** the Lewis Flight Propulsion Laboratory was working on a transonic compressor, which makes it possible for the jet engine designer to use high inlet velocities with greater mass flow and increased total engine thrust. While the transonic compressor has not yet appeared in any production engine, the next generation of gas turbine powerplants will use it.

• **Lewis scientists** began studying the afterburning principle, which permits a pilot to just about double the useful thrust of his engine at supersonic speeds while only adding a slight increase in weight and size of the engine, in 1945-6. Today many of the transonic and supersonic fighters being delivered to the services, e.g., F-100, F-102, F-104, F4D, F-86D, F-89D, F3H, F7U-3, etc., are equipped with jet engines fitted with afterburners.

• **While every military plane** in production was still fitted with straight wings in 1945, NACA was already analyzing wing sweep back. Because the agency discovered swept wings could be advantageous at higher speeds, airframe designers started using the principle in the F-86, B-47, and numerous other models.

• **Investigations** of where to place the engine inlets were begun by NACA in 1939. It was these studies that helped such companies as Republic and NAA place the inlet in the nose in the F-84G and F-86F but on either side of the fuselage and underneath in the case of the RF-84F and the F-86D.

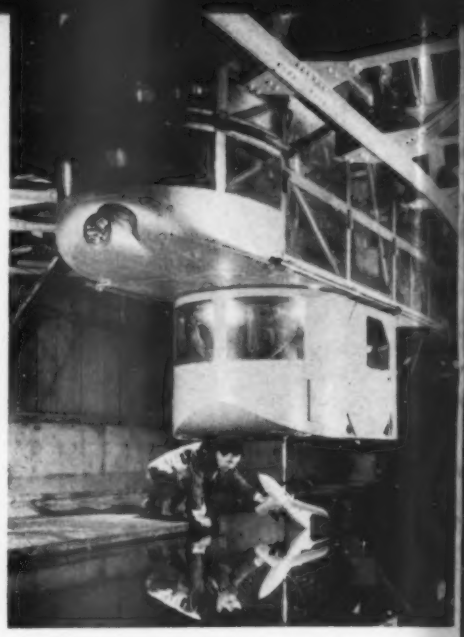
• **Work on hydro-skis** has been under way for several years at the Langley tank and various configurations have been tried. This has already resulted in Convair's F2Y Sea Dart and several future Navy planes will probably also utilize the hydro-ski principle.

• **NACA-Lewis** has been in on the atomic-powered airplane ever since the USAF had its NEPA (Nuclear Energy for the Propulsion of Aircraft) project at Oak Ridge in 1947. When the Boeing-Pratt & Whitney and Convair-General Electric nuclear bombers fly (and best estimates now are "less than a decade"), part of the credit will have to go to NACA.

These are only samples of the type of research NACA has been doing. Others would have to include supersonic flying (X-1, X-3, Skystreak and Skyrocket experimental aircraft), variable incidence wings (Bell X-5), transonic flight research (Northrop X-4), fuels (JP-3), location of external tanks, thrust reversers, crash survival, ramjet and rocket engines aerodynamic heating, and many similar or related projects.

Without NACA's type of basic and applied research, the U. S. air arm might well be qualitatively inferior to Russia's and the world's political make-up might be completely different from what it is today. As Dr. Hunsaker puts it, "In these critical days we should be stockpiling research results and engineering data just as we are stockpiling strategic materials and weapons." • • •

Stability studies . . .



Hydroskis are tested . . .

TAC Turns to Rotors; Forms Assault Group

An assault helicopter group of Piasecki H-21B's, to consist of 48 rotorcraft, is being formed by Tactical Air Command. Fourteen have already been delivered to TAC at Sewart AFB, Tenn. H-21's are also being used by Northeast Air Command for resupply work on defense radar lines in Canada, and the Royal Canadian Air Force is planning similar use of these helicopters.

Air Force Offers Sabrejets Under MDAP

The Air Force plans to sell 25 North American F-86F's to the Dominican Republic and 22 to Venezuela for about $9,000,000 and $8,000,000 respectively, AMERICAN AVIATION has learned. The price includes a year's level of support.

Requests for the jet fighters were made by these countries a few months ago, and the AF has determined that it can supply them beginning February, 1956. Some of the F-86F's will come out of AF inventory, while others will come from current production, it was noted.

F-86F's, which went out of production in May, 1954, were recently reordered by the AF.

Dominican Republic has also asked for six Lockheed T-33's, but the availability of these jet trainers has not yet been determined.

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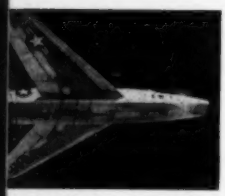
Boeing B-47, over 140 dbs.

Jet Noises Impares Health, Says School of Aviation Medicine

By LOIS C. PHILMUS

COMMUNITIES may be annoyed by the noise from jet airplanes, but maintenance personnel who work around the jets may have their health impaired. That is the considered opinion of the School of Aviation Medicine at Randolph AFB. Already, say these medical authorities, there are known instances in which hearing has been impaired by jet noise.



North American F-100, 180 dbs. (estimated)

At the same time, there is reason to speculate that jet engine noise may be causing brain damage in those working around the jet every day.

Lockheed T-33, over 140 dbs.

• **The School of Aviation Medicine** has issued "sharp warnings" to maintenance personnel about exposure to noise from the explosion of the afterburner of the F-100, for example. It is felt that a man, standing at a 25 degree angle toward the rear of the tail pipe of the supersonic jet could suffer fatally from the noise occurring when the afterburner is turned on.

Convair B-36, 140 dbs.

Because more powerful jet engines and larger afterburners are in prospect, increasing the noise problem for personnel, efforts are now being made to develop protective measures against jet noise.

Boeing B-29, 130 dbs.

• **All present jets** produce noise that exceeds 130 decibels; North American's F-100 is estimated to produce between 176 and 180 decibels. Up to now, accurate measurement of the noise from the F-100 has not been possible because available noise-measuring equipment measures only up to 170 decibels.

Medics at the School of Aviation Medicine find there is a danger of damaging the human ear when noise reaches 90 decibels; the level that causes discomfort to humans is 120 decibels; and the "pain-tickle" level is 140 decibels. This forcefully shows why maintenance personnel, subject to constant exposure through close proximity to dangerous noise levels, must be protected, for their own health and to insure that their work is not adversely affected.

• **Constant exposure** to jet noise may lead to "acoustic trauma." Symtoms are over-all fatigue, nausea, weakness of the knees, irritability, and chest cavity resonance. Without proper protective measures, it has been found that constantly exposed personnel may well suffer temporary or permanent, partial or total, deafness, particularly in the high frequency tone level. The damage is to the perceptive or nerve system of the inner ear. Length of exposure before damage sets in is based on individual susceptibility, but average time is about two months for personnel permanently assigned to high noise areas.

Aviation medicine has found that a two-day rest will offset a lot of the danger of prolonged exposure. The following are precautions now being taken:

• **Ear defenders** are issued to all ground personnel. They are plastic, specially-fitted ear plugs that cut noise reception to near-acceptable levels. A cloth helmet, similar to that worn by plane crews, is now being developed.

• **Weekly hearing** (audiometric) tests are given to all personnel exposed to a minimum of 120 dbs. for at least ten minutes a day. If high tone hearing loss or other symptoms are noticed the man is reassigned to a quieter area.

• **Rotation of personnel** in high noise level areas is recommended to allow for rest periods of two to seven days before returning.

• **Written warnings** are posted prominently revealing dangerous noise areas and protection to be taken when going into these areas.

• **Major noise** sources are moved away from the majority of the population at an air base wherever practical, thus minimizing the number of personnel exposed.

In addition, in some cases the School of Aviation Medicine has actually been able to cut the noise at its sources. One example is at Perrin AFB where a Sabrejet maintenance dock, arranged in a semi-circle, was the scene of seven Sabrejets being run-up simultaneously. Added to the vibrations were seven auxiliary power units.

Two major studies are going on continuously to minimize injury to personnel: (1) operational changes; and (2) evaluation of hearing losses. Too little is known about individual susceptibility in the latter case. The Air Force hopes to determine what other factors, besides noise exposure, can contribute to "acoustic trauma."

North American T-6, 126 decibels

It is believed that many enter service with some minor ear damage already present. A new testing machine will go a long way toward providing the needed data. Just developed at Randolph, the machine will be used to test all Air Force personnel. In this way any pre-service ear defects or unusual susceptibility can be noted before a man is assigned to danger areas.

Air Force to Sell C-82s

Declared surplus by the Air Force, 93 Fairchild C-82's have been offered for sale to the highest bidder. Invitations for bids have been sent to 1600 persons by San Antonio (Tex.) Air Materiel Area.

Fairchild Engine & Airplane Corp., Hagerstown, Md., built 220 of the C-82's, forerunners of the Fairchild C-119 troop and cargo carrier.

Defense May Blacklist Firms as Part of "Dynamic Debt Collection Policy"

Field offices of Army, Navy and Air Force will shortly receive detailed instructions from their fiscal superiors giving them authority to demand immediate cash payment from military contractors who are indebted to the Defense Department. Phraseology of these instructions has just been approved by the Contract Finance Committee under Assistant Secretary Wilfred J. McNeil (Comptroller).

This action is being taken as a result of a directive. No. 7800.3 dated December 23, 1954, by Secretary Charles E. Wilson providing for "the prompt ascertation and timely collection of indebtedness of contractors to the Department of Defense."

It is reported Mr. Wilson issued this order because of losses to the government resulting from laxity by contracting and disbursing officers in advancing money to undeserving contractors. Hence in his order he called for "a comprehensive and dynamic debt collection policy."

While Mr. Wilson's directive is expressed in forceful language, the instructions from the Services go further by stating that contractors who fail in their financial obligations will be "blacklisted" by having their names printed in a hold-up list published by the Finance Division of the Army for use of all Defense officials. One Pentagon official says a "sizeable increase" is expected in this confidential list.

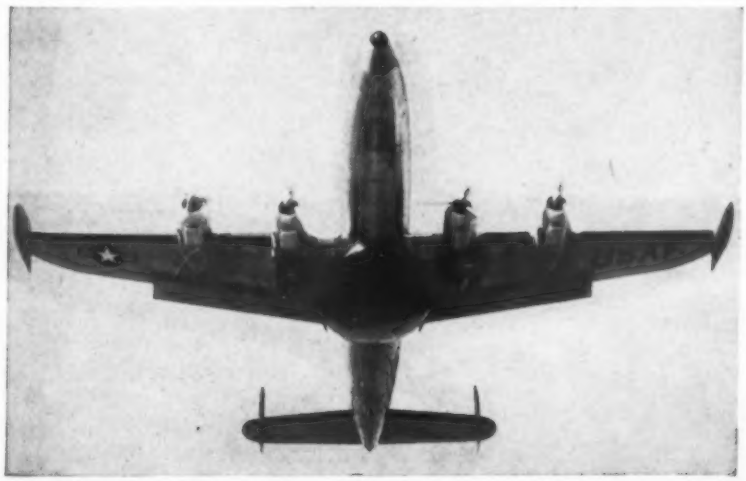
Listed among the ways that contractors become indebted to the government are:

- **Damages or excess** costs incident to defaults in performance.
- **Breach of contract** obligations concerning progress payments, advance payments, or government furnished property or material.
- **Delinquency** in rentals.
- **Expense of correction** of defects
- **Overpayments incident** to errors in quantity, deficiencies in quality, or errors in billing.
- **Retroactive price reductions** resulting from contract provisions for price redeterminations, or for determination of prices under incentive type contracts."

Approved instructions going out to the field offices call for the contracting officer "to demand immediate cash payment in one lump sum." If the full amount has not been paid within 30 days, a set-off against the amount due the contractor is to be made.

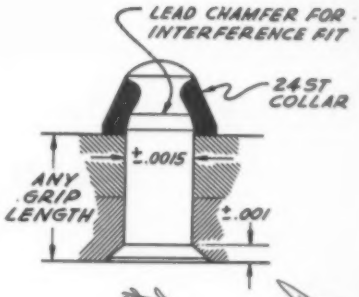
Under special conditions the contracting officer may agree to accept payments over a period of 90 days.

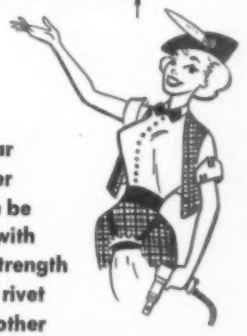
For "unusual situations" where contractors cannot make full refunds over a period of 90 days the contracting officer must get approval of any proposed plan from the contract financing office of his Service. Such proposals are only to be made if it is impossible to collect the debt within 90 days and to attempt to do so might "precipitate bankruptcy or insolvency of the contractor" or prevent performance of the contract. Such extended payments are to bear 5% interest.



EYES OVER THE OCEAN: To lift its radar warning network high above the Atlantic, the Air Force soon will have Lockheed RC-121Ds, with 30-man crews operating five and a half tons of radar and electronic gear, on patrol out of Otis AFB, Mass.

IT'S A BARGAIN— this *hi-shear*





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Turbojet-Turboprop Hybrid

XB-47D, Test Bed For T49 Turboprop

The U. S. Air Force has now cleared additional photos of the mongrel Boeing XB-47D powered by two conventional General Electric J-47 engines plus two of the first Curtiss-Wright T49 turboprop engines. Time may well have obsoleted the once active plans to make an operational aircraft out of the modified Stratojet bomber but, as a flying test bed for the T49, the plane remains a significant step in engine development.

Major change in the B-47 appears to be the removal of the two (one on each wing) double engine pods and substitution of the newly designed single T49 pods. Because of propeller clearance requirements, the support strut holding the pod was shortened several feet. This makes the inboard installations look much more like the Douglas type jet engine mount.

The T49 is rated at slightly under 10,500 pounds thrust.

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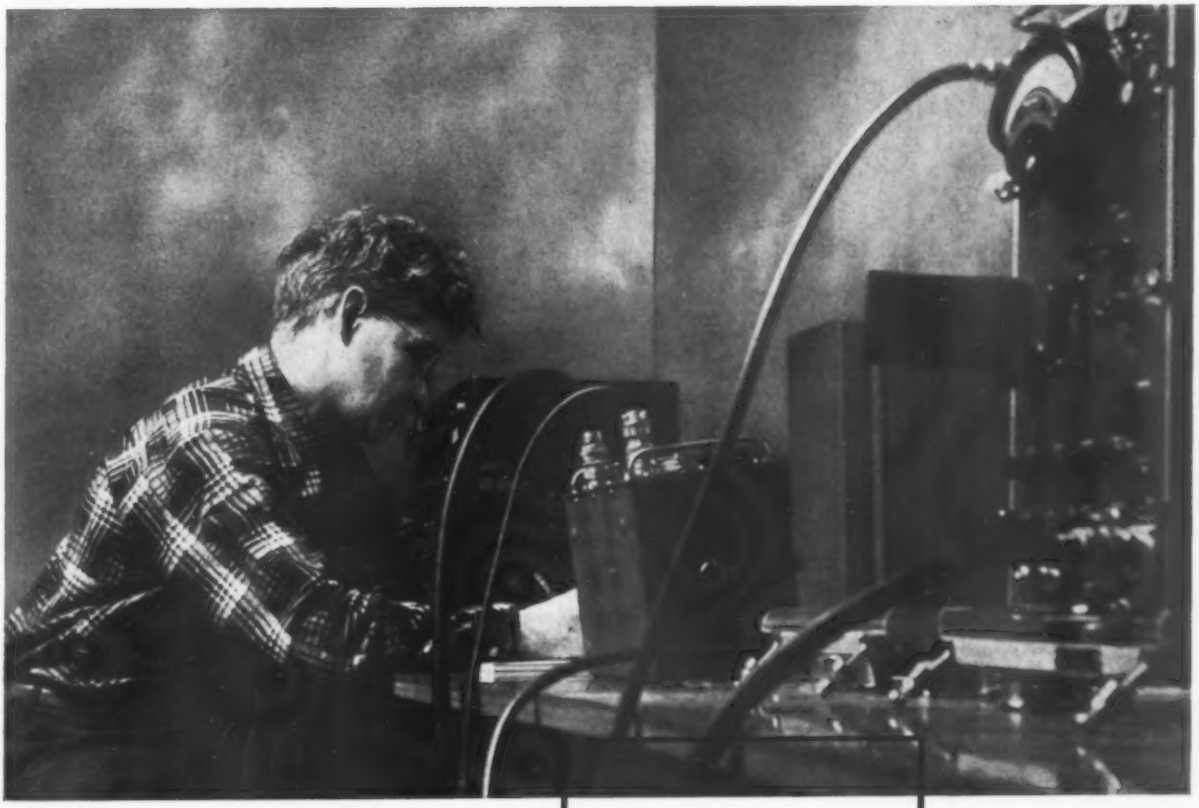

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Machine Age Comes to Electronics Assembly

• IBM's "Autofab" builds electronic components

AUTOMATIC ASSEMBLY of electronic components, one of the most significant research and development programs in the industry, has moved from the laboratory into the shop. The transition has been highlighted by the sale and delivery of the first "Autofab" unit to International Business Machines Corp. "Autofab" is an automatic machine for attaching diverse electronic components to printed circuits.

Developed and manufactured by the Mechanical Division of General Mills, Inc., the machine has an estimated capacity of more than 200,000 assemblies per month, working a 40 hour week. This is accomplished with only three people, two operators and a supervisor.

The first machine delivered to IBM will be put to work on printed circuit sub-assemblies for air defense computers but represents a significant forward stride in the electronic industry's far-reaching program to bring greater reliability and lower costs to electronics. General Mills' independent development closely parallels the intense development activity along these line by the USAF and Navy through industry contracts.

Major components of the "Autofab" unit include a feeding mechanism, 24 attaching heads, a conveyor, positioning mechanism and interlocks. Their functions are as follows:

• **Feeding mechanism:** Holding as many as 400 plates, with protruding lugs, the feeding mechanism holds the supply of printed circuit base plates, drops them onto the conveyor belt which carries them to the attach heads.

• **Attach heads:** Twenty four attach heads carry the individual components to be fitted to the base plate. About 600 of the average components can be loaded into one attach head. Attach heads are interchangeable so a particular component can be attached at any place along the conveyor line. A common cam saft operates all attach heads simultaneously, permitting up to 24 operations at the same time on different base units.

• **Conveyor belt:** Transfer of base plates from the feeding mechanism to the attach heads and on through the entire assembly process is accomplished by the conveyor belt.

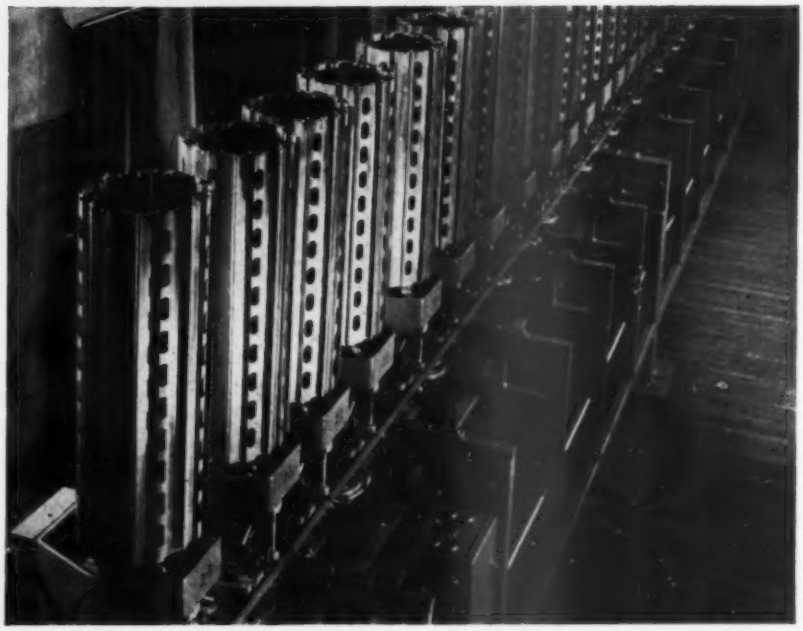
• **Positioning mechanism and interlocks:** As the base plate moves along the conveyor, it must be positioned under the attach head. Interlocks are used to assure proper sequencing.

A major advantage of the "Autofab" is that it is a flexible tool which can be adopted to any circuit. Any number of operations up to 24 can be performed and various size base plates from two to ten inches in either length or width can be handled. Attach heads weigh only 25 pounds and can readily be handled by one man.

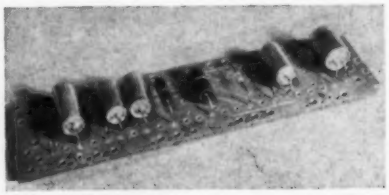
The methods used in attaching components to the base is typical of the machines flexibility. They can be laid flat on the board, with a "stand-off" from the board, or mounted in holes spaced closer together than the length of the component. Loading magazines can not be installed backward and thus proper orientation of polarized components is positive.

General Mills' Mechanical Div. is now building an automatic dip soldering machine designed by IBM for the soldering operation following mechanical assembly.

Also under development is a machine to prepare and load components where all but polarized components could be made ready for assembly. This machine would straighten and trim leads and load components into magazines for attachment to the turrets.



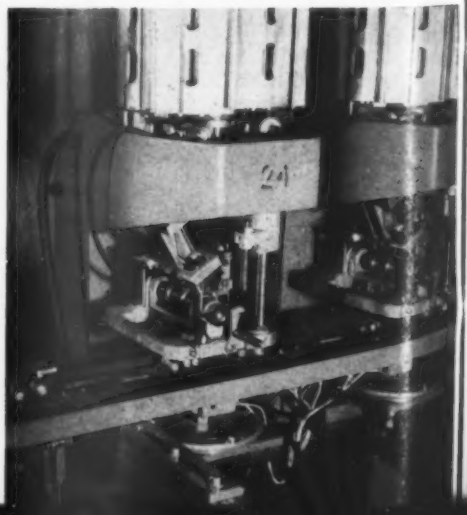
Complete "Autofab" electronic assembly line shows 24 feeding mechanisms mounted above conveyor which transports printed circuit plates during assembly.



Completed assembly with components which have been assembled by "Autofab."

Central figures in design of "Autofab," Dr. Cledo Brunetti and T. R. James give equipment a final check.

Attach head detail is evident in final operations as complete unit leaves the assembly line.



Guided missile *Regulus* is named for a star of the first magnitude, in the northern constellation Leo.

The Navy launches ships that sail the skies...UNMANNED!

From the Aleutians to Madagascar, from Greenland to Magellan's Straits, across the 70% of the world that is *deep water*, the Navy's strength is your security. Not only our own shores, but our sea lanes and far-flung bases must be protected.

Today, from ship, shore or submarine, your Navy can launch remotely or automatically controlled missiles, "birds" with built-in "brains" that guide them unerringly to their targets. The Navy's *Regulus*, built by Chance Vought, is more than just a guided missile. It's a symbol of your New Navy's ability to control the seas and the skies above the seas.

Regulus Gets the Most Out of Every Tax Dollar... Designed in its test and training versions with a retractable landing gear, it can be recovered and flown again many times. This unique feature means more crews can be trained and more test data gathered at far less cost. The life expectancy of most missiles is one flight. In contrast, one Regulus missile has flown 15 times!

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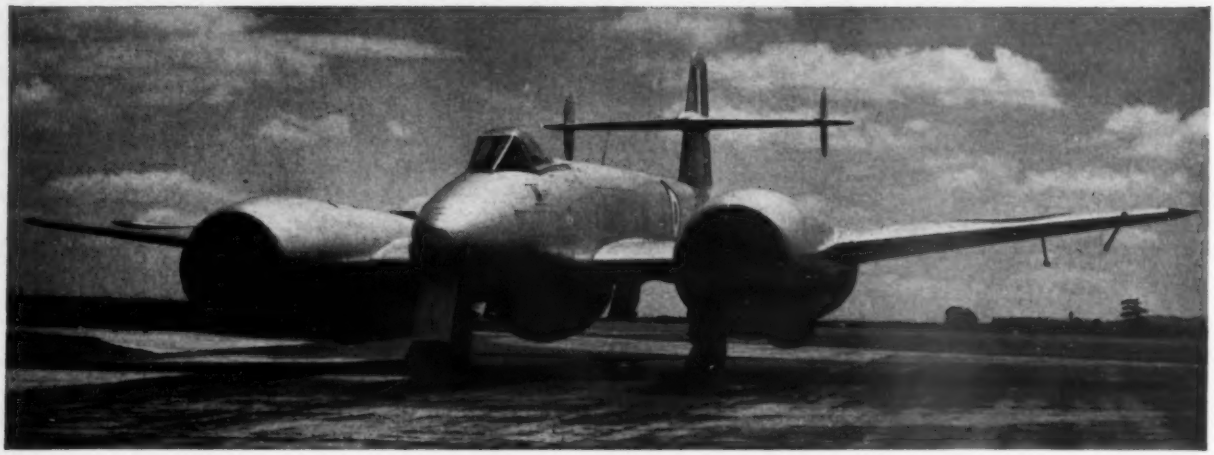
Jet Deflectors Give British Fighter Vertical Thrust



Gloster Meteor with jet deflectors (beneath engines).

A NEW development in the vertical take-off aircraft field has been disclosed in Britain where a Gloster Meteor fighter has been under test using jet deflectors. The deflectors provide a means of diverting a large part of the jet engine power downward to provide a vertical thrust component which sharply alters the aircraft's flight characteristics.

Specifically, Westland Aircraft, Ltd., which handled the jet deflector installation in the Rolls-Royce Nene powered Meteor, claims that by deflecting 60% thrust on approach, approach and stalling speeds are reduced up to 20%. This was not the limit.

The jet deflector was developed by the National Gas Turbine Establishment at Farnborough and installed by Westland which also conducted initial flight tests.

The deflectors (see photo) are located midway along the jet pipe to enable the thrust to act through the center of gravity. A British spokesman said the system could best be described as a cross between a conventional jet aircraft with only forward thrust component for the engines and the Bell type VTOL with up to 100% vertical component possible. While the jet deflector equipped Meteor could not function as a VTO, it provides a means for shorter take-offs, slower, shorter, landings and generally safer operations.

The plane is now undergoing further tests at the Royal Aircraft Establishment, Farnborough.

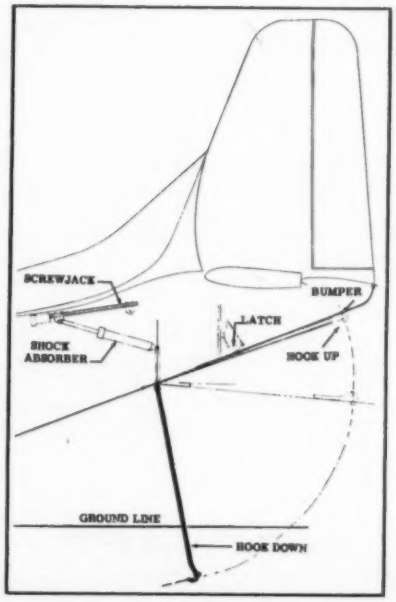
Fairchild Proposes Carrier Version of C-123B

A carrier version of the C-123B Avitruc has been proposed to the Navy Bureau of Aeronautics by Fairchild Aircraft Division.

Called the "Flying Lighter" (after the Navy's surface supply ships), the plane would be used to pick up priority cargo and passengers from land bases close to the fleet and transport them to carriers at sea. It would be equipped with a landing hook (*drawing, right*) for aircraft carrier operations.

This, Fairchild points out, would speed the present system, in which cargo is taken from the long-range FLAW planes, trucked to a port of embarkation, reloaded on a surface vessel, and transferred to the carrier days or weeks later.

The "Flying Lighter" could carry eight tons 1200 nautical miles or four tons up to 2100 nautical miles. This would mean a single plane could carry 500 tons of priority cargo a week.



Future of Air Freight Predicted by Prescott

Air freight will become as important to the aviation industry as rail freight is to the railroads, if properly handled, according to Robert W. Prescott, president of The Flying Tiger Line. Lowering rates is one of the ways in which this goal may be attained, he declared, announcing that FTL plans to file a request for rate cuts in the near future, primarily on eastbound traffic.

Monthly revenue for FTL is now over one million dollars. Key factors in the carrier's present business upturn are the use of DC-6's, which make possible regular overnight deliveries; institution of a labor-management committee; and a sales staff on a commission and drawing account basis.

One effect of air freight is to increase markets for some commodities, said Prescott. "Flowers from California," he said, "have increased in volume to the east 600-700% with air shipment."

USAF Convair YC-131C is Powered by Aeroproducts Propellers and Allison YT56 Turboprop Engines

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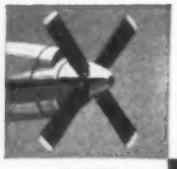

TURBOPROP

AIR-DRIVEN HYDRAULIC PUMP

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And most importantly, turboprop engines equipped with Aeroproducts turbopropellers combine high power with low weight—features important in aircraft design and in airline operation.

Today, Aeroproducts turboprops are America's most widely used because they have proved their quality and stamina on the Allison Turboliner, the USAF Convair YC-131C, and other military aircraft. They are backed by more flight hours than any other American-made turbopropellers.

Whatever your design demands, you'll find Aeroproducts ready to meet your most detailed specifications—not just for turbopropellers, but for all propellers requiring high horsepower absorption. Also available are actuators, air-driven generators and air-driven hydraulic pumps, with other aircraft components still under development. Call or write us for details.

Gas Turbines for Helicopters: Size Is Only Remaining Problem

A PISTON helicopter engine rated at 1000 hp, with fuel consumption of 0.7 lbs. per hp per hour, would burn $30,000 worth of fuel in 1000 hours. In the same time, a similar gas turbine engine would use only $12,000 worth. This gap will soon be widened. Engine manufacturers already know how to swing the balance further toward the turbine.

Forthcoming shaft turbine engines will also:

• **Weigh** approximately .5 lb. per hp, a 100% improvement over current piston engines.

• **Sell** for approximately the same price per hp as piston engines.

• **Boast reliability** comparable to that of the jet engine, which has already on some occassions surpassed its piston rivals.

With such predictions the case for the helicopter gas turbine was argued recently by H. T. Hokanson, of General Electric's Small Aircraft Engine Department.

"Gas turbines are truly a product of the newest and best in materials, methods, ideas, and know-how. They permit doing things that were previously impractical or impossible," Hokanson told a Washington meeting of the American Helicopter Society's southeast region.

Dollar advantage in fuel consumption enjoyed by turbine engines reflects two facts—its JP-4 fuel costs 10¢ per gallon vs. 26¢ for piston engine fuel, and helicopters operate a large part of the time at or near full power.

• **Specific fuel consumption** of piston engines increases as power increases, but the reverse is true of a turbine, which steadily reduces its specific fuel consumption as it approaches full power. As a result, asserts Hokanson, "in the major area of helicopter operation the SFC of a gas turbine is approximately equal to that of a piston engine . . . I am confident that fuel economy will be improved appreciably during the next five to 10 years. We already know how to do it."

• **The light weight** of the modern turbine engine (½ lb./hp) may be exploited in a variety of ways. Two hypothetical helicopters of the same gross weight and carrying the same payload illustrate the difference in terms of endurance. With a piston engine, endurance would be 2½ hours of flight time; with a turbine, 3¾ hours.

GE's HOKANSON
4 million hours of experience

• **Reliability** will also be a major advantage. "We have built a lot of jet engines at General Electric," Hokanson told the AHS, "and we have learned a lot about their reliability and durability." To back up his optimism he offered some statistics:

• **Over 23,000 G-E J47's** have been put into service and over 30,000 delivered.

• **Operating time** has reached four million hours, with the total climbing at the rate of 300,000 hours per month.

• **For each major overhaul,** the J47's have flown the equivalent of 10 times around the world.

• **Engine troubles** reported to GE are now running four to six per 1000 hours of operation, including failures due to tools absentmindedly left in air ducts, from which point they are sucked into the compressor.

• **In more than one** large USAF exercise Boeing B-47's have operated without a single J47 failure; during a comparable period of one large airline's operation with piston engines, three failures would be normal.

Such figures on reliability include early experience when the J47 ran only 7½ hours between overhauls, in contrast to today's standard 1200 hours.

Hokanson, who is manager of G-E's T58 project, a 900-1000 hp turbine under development for helicopters, draws similar parallels between J47 experience and what may be expected of a helicopter turbine with respect to dust, dirt, and foreign objects.

At two Korean fighter bases, less than one engine removal per 1000 hours was caused by foreign object damage during 80,000 hours of combat operation. Most damage came from stray tools or from stones kicked up by the jet exhaust of the plane ahead. There is virtually no vacuum cleaner action with the J47, and a smaller engine would be even less likely to suck in objects from the ground.

How a helicopter turbine will react to large amounts of sand stirred up by the downwash of the rotor is still unknown, but a recent J47 test showed that engine to be virtually immune. About 350 pounds of sand, at two pounds per second, were poured into an engine mounted in an airplane. After three minutes the sandblasting had worn a 3″ x ¼″ hole in the tailcone and the engine was removed to a test stand. The shroud ring and tail cone were replaced.

When the engine was run again, the lubricating system showed no sign of sand and operation was normal. Engine performance was off only slightly, due to compressor blade erosion.

"A gas turbine is a rugged and reliable piece of machinery," declared Hokanson. "About the only thing that really remains to be done is to build them in the right sizes for helicopter use, and people are already at work doing that."

• • •

More Business Flying In '54, Says CAA

CAA reports that 61,000 general aviation aircraft flew a total of 8,527,000 hours in 1953 and an estimated 8,772,000 hours in 1954, about 167% more hours than flown by the scheduled airlines in 1953.

Business flying accounted for 42% of the total general aviation time flown for a total of 3.6 million hours and 499 million aircraft miles in 1953. The 1954 estimate shows an 8.1% increase over 1953's hours flown. The CAA survey found that business transportation has increased 3.4 times between 1946 and 1953. Its 1953 hours flown was a million greater than the scheduled domestic airlines and only 19 million less aircraft miles.

The following table shows hours flown in general aviation by types of operation for 1953 and 1954. Pleasure flying, CAA notes, showed a slight increase for the first time since 1949.

General Aviation	1953	1954 (estimate)	% of change
total	8,527,000	8,772,000	+ 2.9
Business	3,626,000	3,918,000	+ 8.1
Commercial	1,649,000	1,750,000	+ 6.1
Instructional	1,248,000	1,061,000	—15.0
Pleasure, etc.	2,004,000	2,043,000	+ 1.9

COMMON CHARACTERISTICS OF ALL TYPE 2131 GEARED MOTOR GENERATOR UNITS

O.D. of Case.....1.000 inch
Case Length.....3.301
Weight.....7.5 ounces
Frequency.....400 cycles
No. of Poles (Motor).....6
*No Load Speed (Min.).....6500 rpm
Rotor Inertia.....1.1 gram-cm²

*Motor Speed at input to gear train

NEW
integral gear head in small servo motors

OUTSTANDING FEATURES OF TYPE 2131 GEARED MOTOR GENERATOR

- New methods of manufacture result in high efficiency
- High torque to inertia ratio to give fast response
- Available for 115 volt–115 volt two phase or single ended tube operation
- High impedance winding for direct plate to plate operation available
- High generator output voltage with excellent signal to noise ratio
- Zero degree phase shift in generator
- All metal parts corrosion resistant
- Extremely wide operating temperature range

Other models of one inch O.D. units

TYPE NO.	DESCRIPTION
2103	Induction Motor
2101	Geared Induction Motor
2028	Motor Generator

A new line of units has been added to the Kollsman "Special Purpose Motors" family combining precision machining, advanced electrical design and the latest in new materials. An unusual feature of the new line is the integral gear head unit. Contained within a single case is the gear train and motor; or gear train, motor and generator. Gear ratios as high as 300:1 can be supplied.

This new line consists of Induction Motors and Induction Generators supplied separately or combined in a single case one-inch in diameter. The new motors have been designed to give the maximum torque per watt ratio with the minimum rotor inertia. The generators have been designed to give the maximum output voltage with the minimum residual voltage and phase shift.

One of the principal features of the Kollsman "Special Purpose Motors" is the interchangeability of parts which permits numerous electrically different combinations of motor and generator windings within the same case.

INPUT PER PHASE ONLY 1.8 WATTS

ELECTRICAL CHARACTERISTICS OF TYPICAL TYPE 2131 GEARED MOTOR GENERATORS

				MOTOR		GENERATOR		
TYPE NO.	EXCITATION FIXED	EXCITATION CONTROL	INPUT PER PHASE	STALL TORQUE	Theoretical Acceleration At Stall	EXCITATION FIXED	INPUT	OUTPUT PER 1000 rpm
2131-0411110	26	26	2.3	0.4	25600	26	1.8	.51
2131D-0412120	26	26	4.0	0.6	38500	26	2.2	.68
2131D-0413120	26	26	1.8	0.3	19200	26	2.2	.68
2131-0460600	115	115	4.0	0.6	38500	115	2.6	1.00
2131-0463600	115	55	4.0	0.6	38500	115	2.6	1.00
2131-0470600	115	P-P	4.0	0.6	38500	115	2.6	1.00
	volts	volts	watts	Oz-n	rad/sec²	volts	watts	volts

Latest catalog and/or complete specification drawings will be sent upon request.

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Circle No. 15 on Reader Service Card.

More Plastics for Aircraft

By WALTER KILRAIN

AN ALL-PLASTIC MISSILE offering no reflections which could alert radar warning nets, yet lighter and cheaper than metal types, "will undoubtedly be practical," in the opinion of the Ryan Aeronautical Co. Plastic laminated sheets, with foam and honeycomb backing, would provide a structure as strong as metal, the company believes.

The progress being made by plastics is reflected, not only by such predictions, but also by last year's use figures: three billion pounds, more than aluminum and almost as much as glass. Automotive and aviation uses above accounted for

PLASTIC DIES formed by drop hammers at Lockheed.

five million pounds of thermoset plastics. The highlights of such progress were outlined recently as representatives of plastics and the aviation industry met in Los Angeles under the auspices of the Society of the Plastics Industry, Inc. Among the progress reports:

• **Weight of the wing** for the Radioplane Co.'s target drone, the OQ-19, was reduced almost 30% by an experimental change from conventional metal construction to a wing made of Fiberglas and bonded paper honeycomb core. Weight dropped from 39.25 pounds to 27.63 lbs. At the same time, protruding rivet heads and lap joints were eliminated. The new wing construction was evolved under an Air Force contract initiated by the Air Materiel Command. Object was to use as much non-strategic material as possible. The plastic configuration, designated the XQ-10, is expected to save 120 pounds of aluminum per target, if adopted. "The success of this project will lead the way to greater utilization of glass fiber reinforced plastics in missile production." (Harvey G. Spencer, project engineer, Radioplane Co., Van Nuys, Calif.)

• **Plastic wing** for the KDM-1 drone (Martin's Plover) is being developed by the Cornell Aeronautical Laboratory, under Bureau of Aeronautics contract. The wing, details of which were not disclosed, reportedly weighs six per cent less than the aluminum honeycomb, aluminum skin wing which it may replace. Manhours required for fabrication are expected to be cut about 30%. Static tests are now being run at Martin. (Norman E. Wahl, chief, wood and plastics section, Cornell Aeronautical Laboratory.)

• **Plastic dies** for aircraft tooling were hailed by Lockheed. New group of plastics for tooling, known as "epoxy resins," offers low shrinkage (only about 0.5% upon curing), excellent adhesion to glass fibers and ease of handling. One reinforced plastic tool weighing only 240 pounds replaced at Kirksite tool weighing 3100 lbs. The latter also required a 1000 lb. special dolly to keep it from sagging.

Advantages of plastics in tooling promise to loom large in the aircraft industry, since typical production involves tooling up for a large number of parts in small quantity, with changes frequent and hurried. In addition, "within the aircraft industry it is said that no self-respecting aircraft designer would be caught drawing a straight line or a flat plane. Compound contours are the rule, and the most difficult to tool." (G. J. Walkey, manager, research engineering, Lockheed Aircraft Corp.)

STARTER TANK FOR JETS is 35% lighter in plastics than in steel. Developed by Bendix Aviation and Apex Electric Mfg. Co.

• **High-temperature advantages** of plastics were cited by representatives from Hughes Aircraft: "Their ability to retain a large portion of their inherently high strength at temperatures of 400° F. to 500° F. places them above magnesium and equivalent to aluminum in this class of aircraft structural materials. In competition with machined or fabricated metal components they hold distinct advantages."

As an example of high-temperature strength, anti-icing ducts, carrying hot exhaust gases, have withstood 400° F. for 50 hours with no apparent change except slight surface oxidation. Use of laminates in engine compressor blades, compressor housings, and pressure heads were cited. Large plastic control surfaces and fuel tanks, designed to withstand temperatures up to 500° F., are in the final stages of development at one aircraft company. For short periods of time the same company is said to

WHERE PLASTICS ARE USED AND WHY

Part	Strength Weight	Corrosion	Thermal	Electrical	Formability	Low Thermal Conduct
Radome	x	x		x	x	
Duct, Hot Air	x		x		x	
Wing Tips	x	x		x*	x	
Firewall	x		x			x
Battery Box		x		x	x	
Tank, Fuel	x	x			x	
Fuel Cell Liner	x	x			**	
Tank, Ballast	x	x			x	
Radar Scanner	x				x	
Window Frame	x					x
Antenna Mast	x	x		x		
Canopy Fairings	x	x			x	
Insulators	x	x		x	x	
Doors	x	x			x	

Source: R. W. Matlock, Zenith Aircraft

** Electrical Properties used in most cases.*
*** Metal flowers, preventing hole from sealing.*

How to open a Watchmaker's Eyes...

Many people regard a 21-jewel watch as the ultimate in precision. Yet, a modern airplane engine is built to a standard of precision far beyond that of the finest watch. For the engine, with moving parts machined to the Nth degree, must operate at speeds in the thousands of revolutions per minute, at temperatures that would melt many metals. And they must do it hour after hour under full load.

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have tested plastics from 3500° to 4000° F. in jet vanes, gas generator tubes, and rocket motor liners.

Concluded the authors of the paper: "The broadest field for expansion will be opened first by the development of improved techniques for the molding and fabrication of existing materials, and second, by the development of better, new materials." (D. M. Hatch, Jr., and W. Crofut, Microwave Laboratory Research and Development Laboratories, Hughes Aircraft Co.)

• **Low stiffness of laminates** is the prime reason why they have not been widely applied in structural applications, declared the Navy. Contributing factors: non-uniformity and low ductility. In a program to eliminate such drawbacks the Navy has participated in or sponsored research work at Forest Products Laboratory, Madison, Wis. Imperial Glass Corp.; and the National Bureau of Standards. Main goal: to produce a glass fiber with a Young's modulus of elasticity of 20 million pounds per square inch, twice that of present fibers. Relationship between fiber and resin, and the nature of the bond between them, is the main object of the NBS research.

The Navy's conclusion: "While glass fiber reinforced low pressure plastic laminates offer numerous advantages for specific structural applications in aircraft, they must be improved, particularly in stiffness and wet strength, if they are to compete successfully on a strength/weight basis with the aircraft alloys." (J. M. Stevens, P. M. Goodwin, Bureau of Aeronautics, U. S. Navy.)

The interest provoked by the Los Angeles conference reflected widespread efforts by aviation firms to capitalize on the advantages of plastics and to find ways of dealing with their drawbacks. Ryan Aeronautical Co. started its efforts eight years ago, when it began to fabricate cruciform fins and tail-cones for Ryan Firebird air-to-air missiles. By now it has had time to become familiar with plastics' disadvantages. Some tend to chip at the corners and wear at the edges. Most of their catalytic agents are toxic to the skin. Raw materials are far from cheap: phenolics cost 50¢ a pound, polyesters 35¢, and epoxies between 60¢ and $1.50. When cost of fibre laminates are added in, the total equals or tops the costs of other raw materials.

• **In addition,** production is relatively slow. Metal parts can often be stamped out at a single blow, but with plastics each granule is converted from solid to liquid, applied to a form in layers, then converted back into a solid, a time-consuming process. One-inch plastic pipe can be extruded at 300 feet per hour. Steel pipe of the same size can be turned out at 36,000 feet per hour.

Proof that the advantages outweigh such disadvantages is offered by the fact that Ryan's plastic operations have been steadily expanded until today the firm is turning out hundreds of plastic parts, tools and dies, and fixtures. For its Firebee drone/missile, plastics provide nose cowls, combination oil tanks and intake ducts, battery covers, and gasoline sumps.

• **Just as important** as the plastic parts are the use of these materials in construction of tools and dies. Large expending mandrels developed by Ryan use dies consisting of eight segmented "shoes." These are expanded radially, exerting up to 4800 tons of force. Making these shoes from Kirksite took 596 manhours; when made of epoxy resin they are produced in only 253 manhours. Cost has been cut by two-thirds.

EXHAUST SYSTEM AUGMENTOR for new transport is examined in Ryan pattern shop.

Part of Ryan's success may be attributed to its ability to develop time-saving techniques. Conventional technique involves pressing a mold firmly against its plastic part by surrounding it with a bag from which the air is then exhausted. The resulting vacuum supplies the required pressure, but wrinkles in the bag and pockets of trapped air must be carefully removed by hand wiping. In a new technique developed by Ryan, a plastic coating is sprayed on the mold, then removed. The part is placed inside the mold, and the plastic cover replaced around them both. When air is pumped out of this cover, it is a perfect fit, with no wrinkles possible.

With its eight years of weighing the plus and minus values of plastics, Ryan sums up its conclusions: "These uses are relatively only a few of the many applications for which plastics have high potential. As new and better compounds are discovered, new areas of usefulness will be opened." • • •

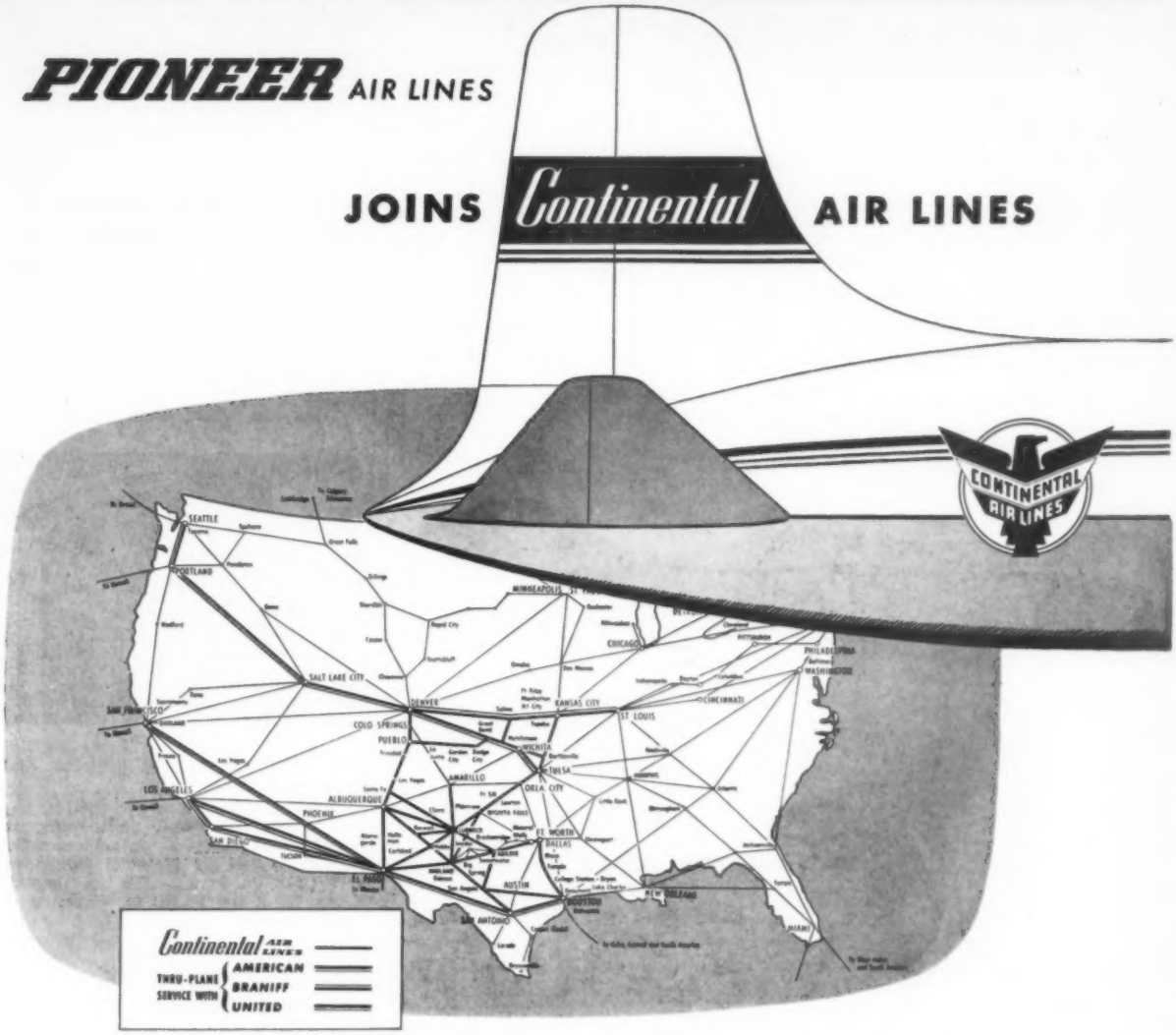
MISSILE NOSE is made by brushing liquid polyester on glass fibre cloth at Ryan.

Plastic Drop Tanks for Britain

The British government has decided that new military aircraft will be designed to use standard plastic drop tanks, instead of aluminum tanks suited to only one particular aircraft. First cost of the plastic tanks is estimated at 25% to 30% lower than aluminum, with the possibility that savings may go much higher in some cases.

PIONEER AIR LINES

JOINS Continental AIR LINES



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On April 1, Pioneer Air Lines' 2000 route miles in Texas and New Mexico, become part of the greater Continental Air Lines system, resulting in the following expanded air service:

- **ONE PLANE, ONE-CARRIER SERVICE between EL PASO and AUSTIN**
- **FASTER SERVICE between DALLAS, FORT WORTH and ALBUQUERQUE**
- **ONE-PLANE, ONE-CARRIER SERVICE between DALLAS, FORT WORTH, ROSWELL, HOBBS and CARLSBAD**
- **MORE FREQUENT SERVICE between TULSA, OKLAHOMA CITY and ALBUQUERQUE**
- **ADDITIONAL FLIGHTS between OKLAHOMA CITY-TULSA and MIDLAND-ODESSA, LUBBOCK and WEST TEXAS POINTS**
- **ADDITIONAL SERVICE between HOUSTON, AUSTIN, MIDLAND-ODESSA**
- **NEW, ONE-PLANE, ONE-CARRIER SERVICE between HOUSTON, AUSTIN and ROSWELL, ALBUQUERQUE**
- **NEW ONE-PLANE SERVICE between SAN ANTONIO, LUBBOCK, AMARILLO**

PIONEER AIR LINES NOW BECOMES **Continental AIR LINES**

Maintenance Bulletin Board

AA Finds Faulty Blade Deicer Caused Rough Engine

In a recent issue of its Weekly Maintenance Letter, American Airlines discussed the case of a four-engine transport which experienced severe vibration for 5-6 minutes while operating in icing conditions, although there was no visual evidence of ice accretion.

The flight crew asked maintenance to check for possible loose gap strip installations, cowling, inspection plates, etc. When inspections failed to disclose routine vibration trouble, the mechanics turned to the prop deicing system. Tests proved that one propeller blade deicing element was inoperative.

The vibration was apparently caused by ice build-up on the one blade with inoperative deicer, thus throwing the prop out of balance. The service letter suggested that this condition could normally be checked in flight by noting indicating lights failing to show deicing current flow, and/or prop deicing ammeter(s) not showing normal current draw. It can also be checked on the ground by feeling the blade element while a man in the cockpit operates the switches. (AA cautions mechanics against leaving deicing on more than 10 seconds with engines inoperative).

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through extensive research, has developed more patented designs of all-metal, one-piece, self-locking nuts than any other manufacturer . . . each product approved for aviation use by the U. S. Army, Navy, and Air Force. Universally accepted, Boots products have shown unequaled records of flawless performance with aircraft and component manufacturers. Boots engineering department is constantly keyed toward improvement. Boots welcomes requests for assistance in the solution of any fastening problems. Write for Boots catalogs and test nut samples.

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BANC-LOC DIVISION
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Circle No. 28 on Reader Service Card.

Scotchlite Marks Danger Areas on MATS Planes

Military Air Transport Service have ordered the use of Scotchlite reflective tape to mark wing tips, trim tabs, leading and trailing edges, doors, call letters, flaps, heater pods, and tail skids of their aircraft. Its use may be extended to include decals and insignia.

It is also being used on propeller

tips to outline the prop diameter and to mark emergency exits.

Prior to adoption by MATS, the tape containing the light-reflecting particles was submitted to extensive testing by the Air Materiel Command at Wright-Patterson AFB in Dayton, O. and by Bolling AFB in Washington, D. C.

NWA Ground Safety Record Improves 20%

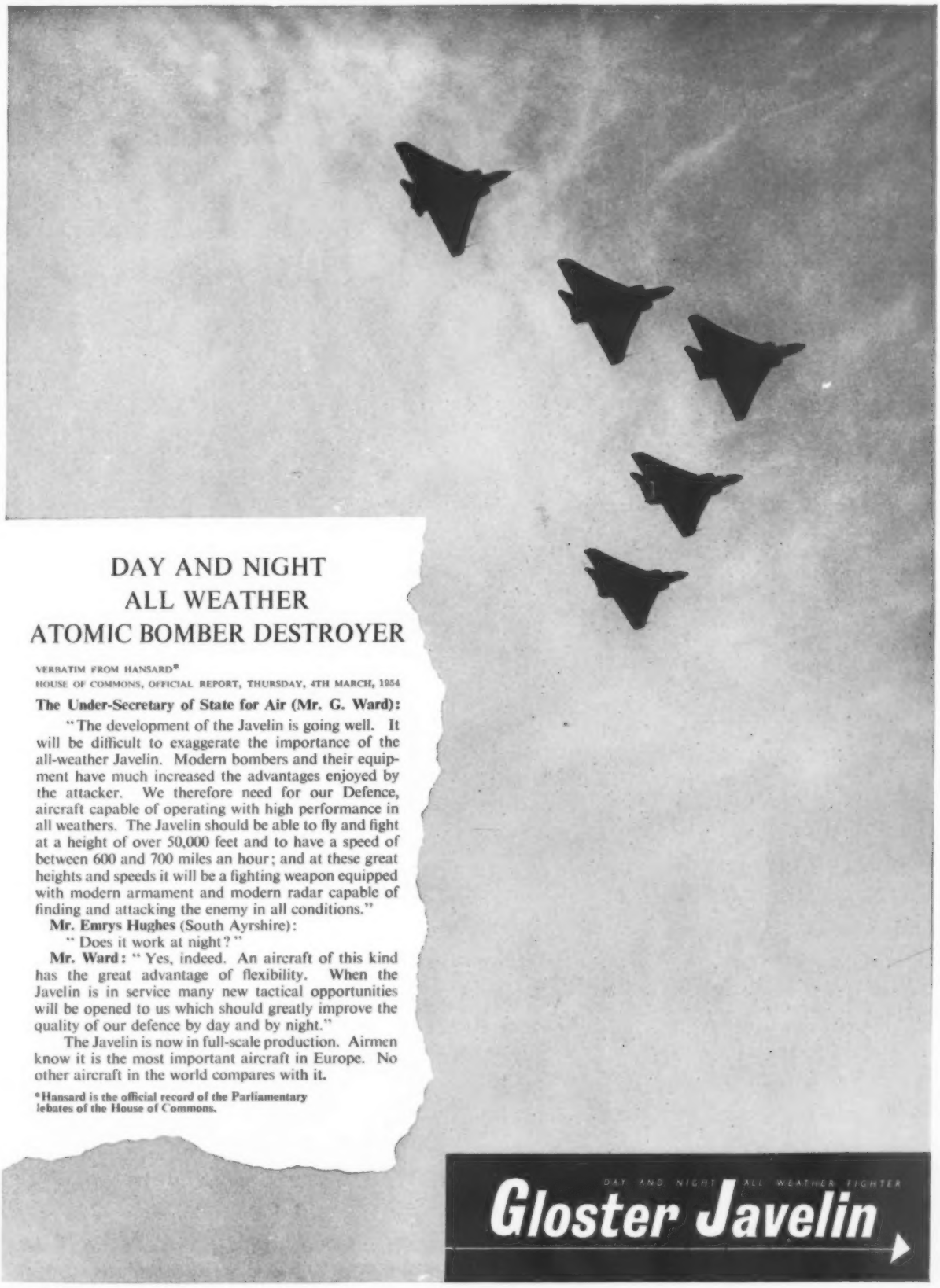
Northwest Airlines experienced a 20% drop in compensatory injuries and 10% drop in lost time injuries during 1954, the second straight year in which NWA improved its ground safety record. The figures relate to the frequency rate of injuries, rather than to number of injuries, and is based on injuries per million man-hours of exposure.

Compensatory injuries, those involving lost time, hospitalization, or treatment by a doctor, dropped from 45.2 in 1953 to 36.3 per million man-hours in 1954 for the entire system. Lost-time injuries dropped from 15.3 in 1953 to 12.8

Lockheed Aircraft Service Boast Safety Record

Lockheed Aircraft Service, Inc., Ontario (Calif.) has a 15-month-long record of operation without an employee losing a day's work due to on-the-job injury. The record dates back to September 1953 and is based on nearly 3 million man-hours worked by 812 employees.

During 1954 the combined Lockheed Aircraft Service Burbank and Ontario plants reported an accident frequency rate of 1.20 injuries per million hours worked.



DAY AND NIGHT ALL WEATHER ATOMIC BOMBER DESTROYER

VERBATIM FROM HANSARD*
HOUSE OF COMMONS, OFFICIAL REPORT, THURSDAY, 4TH MARCH, 1954

The Under-Secretary of State for Air (Mr. G. Ward):

"The development of the Javelin is going well. It will be difficult to exaggerate the importance of the all-weather Javelin. Modern bombers and their equipment have much increased the advantages enjoyed by the attacker. We therefore need for our Defence, aircraft capable of operating with high performance in all weathers. The Javelin should be able to fly and fight at a height of over 50,000 feet and to have a speed of between 600 and 700 miles an hour; and at these great heights and speeds it will be a fighting weapon equipped with modern armament and modern radar capable of finding and attacking the enemy in all conditions."

Mr. Emrys Hughes (South Ayrshire):

"Does it work at night?"

Mr. Ward: "Yes, indeed. An aircraft of this kind has the great advantage of flexibility. When the Javelin is in service many new tactical opportunities will be opened to us which should greatly improve the quality of our defence by day and by night."

The Javelin is now in full-scale production. Airmen know it is the most important aircraft in Europe. No other aircraft in the world compares with it.

*Hansard is the official record of the Parliamentary debates of the House of Commons.

DAY AND NIGHT ALL WEATHER FIGHTER

Gloster Javelin

GLOSTER AIRCRAFT CO. LTD., GLOUCESTER, ENGLAND *Member of the Hawker Siddeley Group* | *Pioneer . . . and World Leader in Aviation*

1. JET ENGINE TROUBLE-SHOOTING. To help minimize aircraft "ground-time," G-E tech reps are available throughout the Free World to help personnel discover, correct unusual engine difficulties.

2. CLASSES IN THE FIELD. Using standardized manuals and visual aids, G-E reps often conduct classes designed to give students a better understanding of jet operating and maintenance procedures.

3. PARTS REPLACEMENT. Tech reps often help determine amount of parts needed to support flight operations, make available tools and test equipment for field use.

On more than 34,000 J47 turbojets delivered . .

6-POINT G-E SERVICE PROGRAM HELPS CUT JET OPERATING COSTS

Over 250 G-E jet representatives at 100 locations in the U.S. and overseas help engine users get peak jet performance—anywhere, anytim

G.E.'s six-point jet service program is set up to help G-E engine users reduce their operating costs and get top performance from G-E J47 and J73 engines. Over the past four years, this program has helped reduce maintenance time-cycles. It has added extra operating life to G-E engines in the field. It has helped cut users' manpower needs. The program includes these major benefits:

WORLD-WIDE COVERAGE—In the U.S. and 13 foreign countries, the six technical services shown below are available at military bases, overhaul stations, spare parts depots, special test locations and G-E repair, overhaul and modification shops.

HIGHLY-SKILLED G-E TECH REPS, key membe of the team, are on 24-hour call at bases he and abroad, in Stateside G-E service sho and through 65 G-E district offices. As part G.E.'s complete technical services, Compan representatives have a library of technic publications and training aids. They also ca supply engine users with training films, visu aids, parts catalogs and handbooks for pilot

PUBLICATION GEA-6136, "Operation Service, describes the six-point program in detail. Fo a copy, contact a G-E Aircraft Specialist v your nearest G-E Apparatus Sales Office. C write *Section 232-4, General Electric Compan Schenectady 5, N. Y.*

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4. G-E REPAIR, OVERHAUL AND MODIFICATION SHOPS provide complete maintenance service to customers. Shops are conveniently located to airframe manufacturers and USAF bases, thus help reduce users' costs.

5. ENGINE SERVICE ANALYSIS. Jet service reports gathered in the field are analyzed in IBM machines to give valuable information for parts replacement estimates, also for improvement of engine design for the Armed Forces.

6. ENGINE TRAINING SCHOOL. Advanced instruction in G-E engine operation and maintenance is given on request to military and civilian personnel at the Company's Cincinnati plant.

For Comressor Blades

Softer Metal Cuts Down Failures

USE OF SOFTER METAL has helped cut blade failures on General Electric J47 jet engines more than 75%, the company has revealed. This greater durability has brought with it savings of about $50 per engine.

What can happen when a blade fails and ricochets through the engine is shown in the accompanying photo. In a compressor there may be 2000 blades (G-E has manufactured 20 million for the J47), each a potential source of trouble. Even if a blade fails in the rearmost stage, it may be drawn forward toward the intake end of the compressor because of the lower pressure which exists there, destroying other blades, the engine, and possibly the aircraft.

• **To reduce such failures** G-E took a new look at the material from which it was making its blades. What it discovered was described to the Society of Automotive Engineers last month by R. E. Weymouth.*

For good fatigue strength and adequate corrosion resistance G-E had originally chosen type 403 stainless iron (iron plus 12% chromium). A hardness of 32-42 Rockwell C had soon been reduced to 32-38 Rockwell C to improve machining qualities. When the re-evaluation of the material was completed the company dropped its specifications to 20-26 Rc and began to enjoy the advantages of better damping characteristics, greater resistance to stress corrosion cracking, higher impact strength, greater latitude in heat treatment, and easier machining.

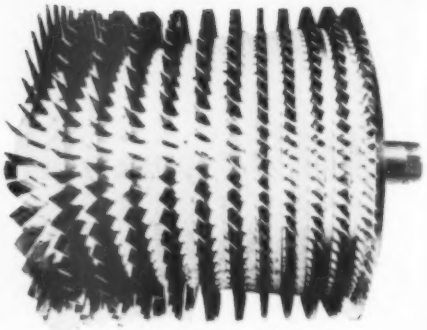
**Jet Engine Compressor Blades—Hard or Soft? By E. M. Phillips and R. E. Weymouth.*

The improvements came from an investigation aimed at discovering the optimum hardness for the material. The 403 alloy increased its fatigue strength as it increased its hardness, but its damping characteristics fell off during the process. Since damping and fatigue strength are described by Weymouth and E. M. Phillips as "probably the two most important property criteria for compressor blades," a compromise had to be found.

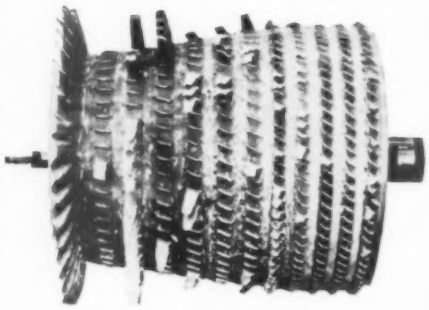
Three types of damping are important in axial flow compressors: material, root or dovetail, and aerodynamic. The first is a function of the material itself. The second results from friction between the blade and the disc in which it is mounted. The third results from the retarding forces exerted by the mass of air flowing through the compressor.

Studies revealed that dovetail damping falls away to little or nothing when rotor speeds are high and the aerodymanic damping is small when the flow of air is relatively low. In compressor stall, aerodynamic damping may reach zero. In such conditions only the internal damping ability of the material itself is left to prevent excessive vibration.

These conditions exist during acceleration. If damping is insufficient at this time and fatigue cracking starts as a result, the blade may fail later at higher speeds. With this in mind, G-E decided that a net increase in safety would result if hardness were reduced and damping capacity increased. The result, in terms of safety, is shown in the accompanying graph. The change to the softer material increased the safety factor by approximately 2½ times.



ROTOR BEFORE FAILURE



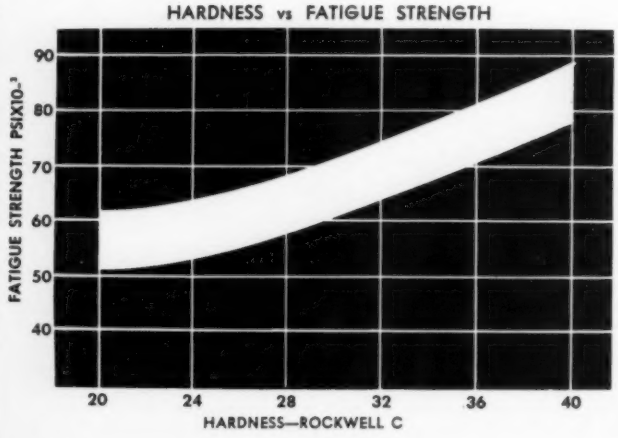
COMPLETE ROTOR FAILURE

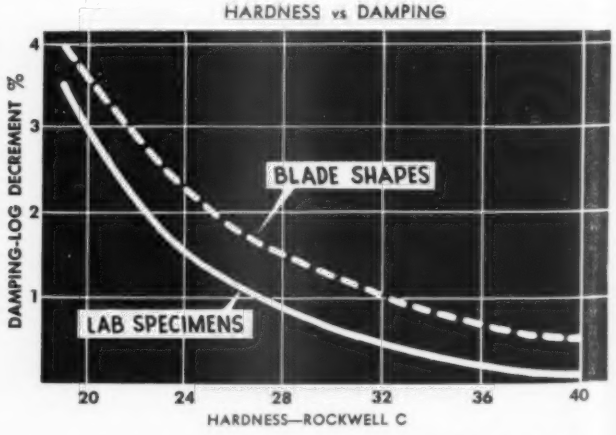
Other advantages included:

• **Stress corrosion resistance** was tested by mechanically deflecting strips of material to various levels of stress, then exposing them to a solution of hydrochloric acid and selenium dioxide. With the softer material, it either took longer for cracking to occur at a given level of stress, or a higher stress could be withstood for the given length of time. Such cracks provide nucleii for fatigue cracks.

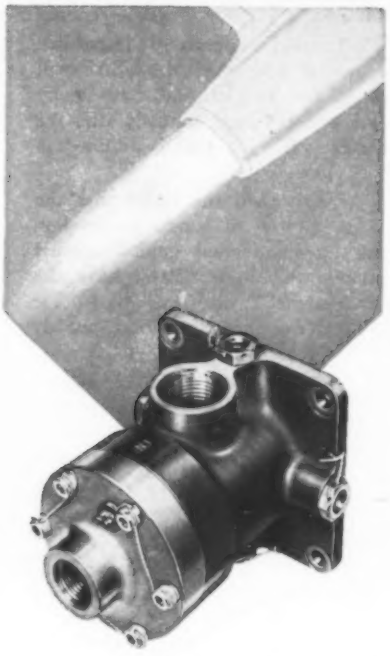
• **Impact strength** is considered important, since 30% of all engine removals come from foreign object damage. Room temperature impact strength rose sharply with the change in material.

• **Heat treatment** was simplified



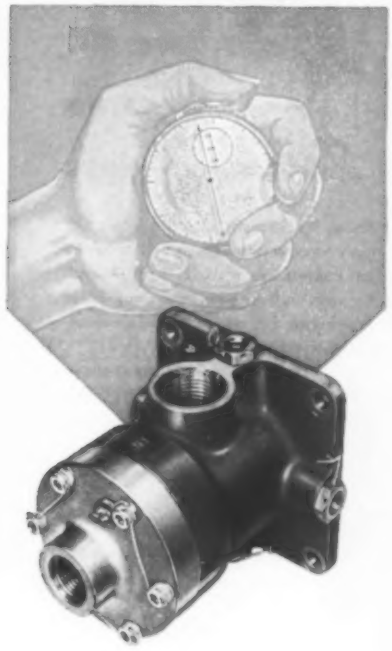


FOR HIGHER TEMPERATURES



FOR HIGHER CEILINGS

FOR HIGHER SPEEDS



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THOS. E. HULL, DIRECTOR

The Air Force Secretary Says:

In an exclusive interview with AMERICAN AVIATION, Air Force Secretary Harold E. Talbott:

• Predicted nothing would come of the proposed Defense Department policy changes in developing and purchasing jet engines —a policy which Aircraft Industries Association president DeWitt C. Ramsey has labeled "catastrophic."

TALBOTT

• Declared the announcement of the reorganization of the Military Air Transport Service would definitely be made before June 30.

• Disclosed the USAF has no plan to buy cargo planes and lease them to commercial airlines similar to that of James H. Smith, Jr., Assistant Navy Secretary for Air.

• Reported that the Navy will continue to use AF-sponsored turbojet engines in future plane designs because some Navy jet development projects had failed. Included will be the Wright J67, Pratt & Whitney J75, and General Electric J79.

• Indicated that while the Air Force favors a stabilized aircraft industry, it has no plan to submit for congressional approval to accomplish this end.

• Stated it is currently impossible to predict how much the USAF will spend for aircraft and how many planes it will need annually after the present 137-wing goal is attained in June 1957.

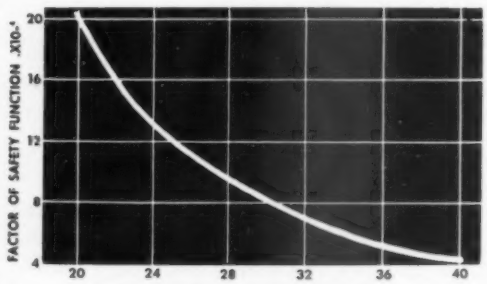
• Expressed the belief that the U.S. is ahead of Russia in developing intercontinental guided missiles because the Soviets don't have the machine tools and know-how. He pointed out, however, that "nobody knows for sure."

• Said the Air Force is not concerned and has no business interfering if two or more aircraft firms decide to merge. Nevertheless, a merged company will probably obtain less AF business than two separate firms.

• Made it clear that there is no USAF policy to eliminate any companies in the program and bring in substitutes. But concerns which are efficient and produce at low cost will get the bulk of the business.

• Asked permission not to comment on a question about whether the North American F-86F fighter-bomber was reordered for friendly nations because of delivery delays of certain U.S. and British airplanes.

during the quench-and-temper operation that follows forging because of the shape of the heat treatment curve. At the higher hardness range the allowable temperature variation was much smaller than at the lower level, where the curve flattens out and gives the heat treating department greater leeway. This, in turn, reduces the number of pieces which have to be rejected and re-treated.



INCREASED SAFETY FACTOR

• Machinability of the softer blades proved to be better, although some adjustments had to be made in shop processes at first.

Results thus far are based on rather limited experience, Weymouth and Phillips point out. Furthermore, the improvement—whatever its extent—may have been influenced by other factors as well as the change in hardness since design and processing changes were made at the same time. With these qualifications taken into account, there still remains the indication that G-E has pointed the way toward a fruitful area of investigation.

"It is to be hoped," conclude Weymouth and Phillips in their report, "that all axial compressor designers will make every effort to enlarge on the knowledge affecting this important subject of the vibration of axial compressor blades." • • •

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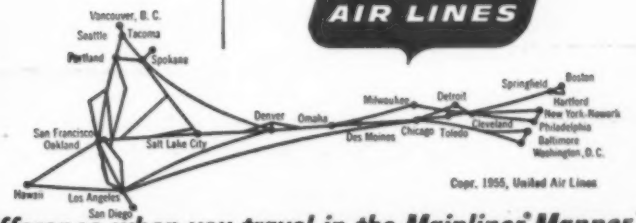
UNITED AIR LINES



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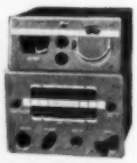

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West Coast Talk . . . By Fred S. Hunter

- **Titanium lightens the F-102**
- **DC-8'S may carry 120 passengers**
- **Allison to tour country with T56'S**

MISCELLANEOUS intelligence: Lockheed will soon have seven aircraft in its turboprop fleet undergoing test with the two Air Force C-121F's nearing flight stage . . . Douglas puts direct operating costs, in the economical ranges, at 96¢ per mile for the DC-6B and $1.07 for the DC-7 . . . A two-spool Allison T56 will make its bow about 1962 . . . Time between overhauls approved for P&W's J57 is reported at 750 hours.

* *

THERE'S A CHANCE the new Beverly Hilton Hotel will enter into a tieup with Los Angeles Airways for a heliport on the roof of one wing if the city fathers of Beverly Hills will stand still for it . . . Goodyear has developed a new multiple disc brake for the DC-7C . . . Convair is reported to have saved 600 lbs. in the new F-102 configuration by titanium substitutions . . . Radioplane's new supersonic Q-4 will be powered by Rolls Royce's 2000-lb. thrust Soar engine.

* *

P&W RECENTLY upped the price 5% on R-2800 engines, making the cost to airlines approximately $44,000 per engine . . . Man with the shortest name at North American Aviation is Kenneth An and the man with the longest is Hans Jongbloed-Unerhorst, and they both work in the landing gear design group.

* *

DOUGLAS DC-8 configurations range from 180,000 to 240,000 lbs. gross for take-off and up to 120 passengers . . . Northrop's high-altitude F-89X has been crossed off, but this doesn't mean the Air Force couldn't reinstate it . . . United Air Lines uses maximum cruise on its DC-7 schedules to Hawaii when the winds don't exceed 10 knots, reduces to a power setting of 1650 hp if the winds average 10 to 15 knots, and goes to long-range cruise when the winds are higher.

* *

THERE'S a growing feeling that the engineering manpower shortage in the aircraft industry might not be half so bad if the government weren't so free with study contracts . . . Herb Moseley, spark plug of American Helicopter Society activities on the west coast, recently moved from Hughes to Hiller . . . Strong hints around El Segundo would have you believe Douglas already has an order for AD-7's.

* *

READER wants to know if Ramo-Wooldridge has been given a missile contract bigger than that of Hughes. The contract isn't, but the missile is . . . Boeing still has not made any application to the CAA for a type certificate for the 707 . . . As of a recent date, Douglas had 16 aircraft in engineering flight test at Edwards . . . Allison plans to retour the country with T56's replacing the T38's in its Convair Turboliner to show off the new engines.

* *

AIR FORCE has ordered two staff C-118's from Douglas, which means a couple of DC-6A's with executive interiors are being ticketed for high brass . . . Pacific Airmotive Corp. indicates it will continue to manufacture test equipment in the east, as well as in Burbank, even though it disposes of its Linden plant . . . Convair calls the advanced-type ejection seat approved for the B-58 the "Convair SACseat.

* *

COMMERCIAL version of Hiller's H-23C for the Army, featuring, metal rotor blades, numerous design changes intended to facilitate production and improve service life, and eventual installation of a 245 hp Lycoming engine de-rated to 220 hp will be known as the Model UH-12C . . . Fletcher is taking an FU-24 out of its line of New Zealand ships for a CAA type certification flight test program . . . An airplane and a bloodhound were teamed up to track down a couple of killers near Albuquerque, showing how things keep progressing in the west these days.

"GET A LOAD OF MY NEW MAGIC CARPET," said Abdullah

"Allah be praised, it's a miracle. My old shaggy Persian model was drafty and small . . . but this amazing SPARTAN conversion has more comforts and conveniences than an ivory palace. What's more, I can carry my samples with me and work while I travel."

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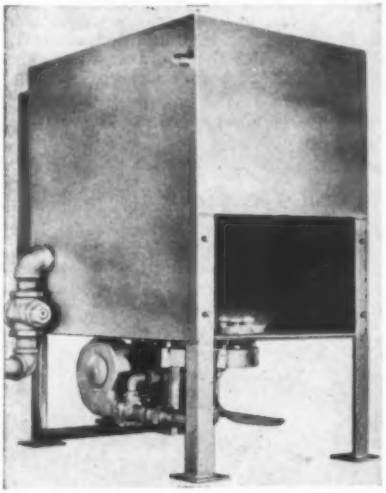
Circle No. 21 on Reader Service Card.

New Products and Processes

Parts Washer

A compact small parts washer using gas-fired "radiant heat" to keep the cleaning fluid at temperature has been developed by Burdett Manufacturing Co. Available in three sizes—100,000-129,000, or 158,000 BTU's per hour, the unit has a capacity of about 50 gallons.



Temperature rise of liquid cleaning compound from 50° to 200° in approximately one hour is claimed. Features include inclined trough for scum removal, an overflow drain outlet, tank of heavy gauge welded steel construction, and an automatic gas valve.

Circle No. 50 on Reader Service Card

Permanent Magnet Generator

A permanent magnet generator mounted coaxially with a two-phase servo motor is in production at G-M Laboratories. Output of the generator can be as high as 20 volts per thousand rpm. Frequency depends on the speed

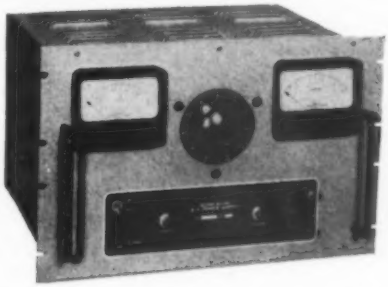
of the generator, which has four-pole winding.

The motor and generator are 2 9/16" long, 0.98" in diameter, and weigh a maximum of 6.3 oz. Unit can be designed to accommodate a temperature range of from —65° to 300° F.

Circle No. 51 on Reader Service Card

D-C Power Supply

Testing and operation of aircraft electrical equipment can be accomplished with the Model KM88 Aircraft Battery Eliminator produced by the Opad Electric Co. The device operates on 115 volts a-c, 60 cycles, single phase, producing a continuously variable out-



put from zero to 28 volts d-c. Maximum continuous load current rating is 20 amperes.

The unit mounts in a 19" rack cabinet, and stands 12¼" high. An ammeter protection circuit disconnects the instrument during periods of high inrush current.

Circle No. 52 on Reader Service Card

Protective Coating

Metal and decorative laminate surfaces can be protected during fabricating operations with a compound developed by the Spraylat Corp. The compound, designated SC-1503, may be sprayed on at a cost of less than ½¢ per foot, forming a tightly adhering plastic film. The film can be removed with water.

Circle No. 53 on Reader Service Card

Power Rectifiers

High-current, high-voltage silicon power rectifiers with efficiency of approximately 99% are in quantity production at the Bogue Electric Manufacturing Co. The rectifier may be used without derating in ambient temperatures of 100° and higher, and has performed without deterioration at tem-

peratures up to 200° C.

The unit occupies about 1/8 cu. in., weighs 1/10 oz., is all-welded, and is hermetically sealed. Ratings range from 100 to 500 milliamperes. Rectification ratios run up to 10^6.

Circle No. 54 on Reader Service Card

Electrostatic Seal

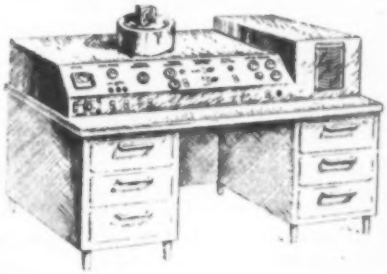
An electrostatic sealing strip which seals out dust and moisture while also shielding against electrostatic interference has been developed by Oliver Tire & Rubber Co. Available in various widths and thicknesses, it consists of a strip of pliable Neoprene, to one or

both edges of which is bonded a margin of finely woven, crushed, silver-plated wire which serves as an effective electrostatic continuity medium. Neoprene strip is compounded to achieve resistance to ozone, low permeability, and high dielectric strength.

Circle No. 55 on Reader Service Card

Gyro Test Console

A precision gyro test console designed to test newly developed, fully floated miniature integrating gyros has been put on the market by Reeves Instrument Corp. The precision turntable can be driven by servo control from the gyro under test or by a synchronous control giving a choice of integral speeds in either direction. Turntable position can be read to an accuracy of 0.1 angular mil. Specially designed blocks for any gyro mount on the turntable in any of three mutually orthogonal positions so that orthogonality or parallelism on



any axis to the reference mounting surface can be measured.

Also provided are precise frequency control of gyro voltages, precise current control of torque generator and signal generator exitations, provision for variable voltage to the gyro, temperature control of the gyro, etc.

Linearity of torque generator can be measured within .03% of full scale reading and signal generator performance within 0.25 angular mil.

Circle No. 56 on Reader Service Card

Self Regulating Turnbuckle

A cable tension regulator now being produced by Bobrick Manufacturing

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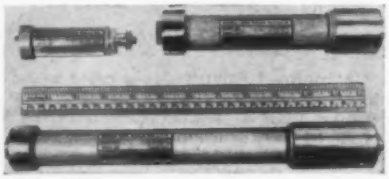
Corp. provides regulation up to 2¼ inches and does so with a weight saving by replacing the barrel of the conventional turnbuckle. Bobrick's "self regulating turnbuckle" can be installed



individually or in series as a measuring instrument in prototype aircraft, where it can be used to determine the proper size unit for production aircraft. The Model J572 incorporates the quick retraction feature for take-up of cable slack.

Circle No. 57 on Reader Service Card

Control Quadrant

A new type self-locking control or actuator has been designed by C. O. Engineering Co. and is in pilot production by Liberty Tool & Machine Co. Manufacturer claims the new unit is

"simple, vibration-proof, irreversible, and self locking without any locking mechanism." In its two forms, as control quadrant or push-pull actuator, it is applicable to throttle, propeller pitch, fuel mixture, carburetor heat, trim tab controls gear operation, and similar functions.

Circle No. 58 on Reader Service Card

Cooling Pack

A new circulatory cooling system for electronic installations has been designed by United Aircraft Products. Weighing approximately nine lbs., the design makes possible the remote in-

stallation of the exchanger portion of the assembly in a ram-air duct or cooled-air duct leading from any refri-

NEW FJ-4 FURY FEATURES "pump that couldn't be built"

Intended for combat at near sonic speeds, North American Aviation's FJ-4 Fury jet fighter is characterized by thin wings. The carrier-based craft, first flown on October 28, 1954, relies on a new-type Pesco fuel transfer pump and three Pesco submerged fuel pumps.

The U.S. Navy's newest jet fighter, the North American Aviation FJ-4 Fury, uses a revolutionary new Pesco pump in a line-mounted fuel transfer application. This—the pump that couldn't be built—is the first centrifugal impeller type pump ever perfected for such use.

The extremely thin wings of the FJ-4 prevented use of submerged fuel pumps in the wing tanks, so Pesco engineered the so-called "impossible" pump. A radically new Pesco-designed impeller permits the pump to overcome long inlet line losses and deliver a full flow of JP-4 fuel up to 45,000 feet altitude. The pump is instantly self-repriming should it become unprimed during manuevers.

Designed for a 1200 hour overhaul cycle, this motor-driven pump is powered by a Pesco-built DC Electric Motor. Precise and powerful, it weighs only 7.4 pounds and its 11″ x 5″ x 5″ envelope fits into a close-tolerance fuselage location.

Three submerged fuel pumps in the fuselage tank are other Pesco components of the fuel system which supplies the Wright J-65-W4 power plant.

The "pump that couldn't be built" typifies Pesco's continued success in solving difficult aircraft pumping problems. If you have such a problem, take advantage of the development facilities, engineering experience and greatly increased manufacturing capacity of Pesco. Call or write: PESCO, 24700 North Miles Road, Bedford, Ohio.

Model 122913-010 Fuel Transfer Pump was specially developed by Pesco for FJ-4. Able to pump boiling fuel, run "dry" for 15 hours and reprime itself, this pump performs a function previously considered impossible for a line-mounted aircraft fuel pump.

engineering Pesco production

PRODUCTS DIVISION

BORG-WARNER CORPORATION

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Circle No. 22 on Reader Service Card.

gerator source. It will operate from sea level to 70,000 ft. and dissipate 350 watts when ambient temperatures do not exceed 131° F. at sea level or zero degrees at 70,000 ft.

Heat exchange package consumes about 60 watts electrical power and no more than 15 watts air horsepower. Hydraulic circuit is pressurized to minimum of 2 psig at —65°F and a maximum of 8 psig at 212°F, preventing overpressurizing. A centrifugal pump supplies the OS-45 cooling fluid. Shut-off pressure of the pump is 17 psi and output 1.75 lbs/min. against a 15 psi head. Maximum pressure on case of electronic equipment cannot exceed 25 psig.

Circle No. 59 on Reader Service Card

Potentiometer

A trimmer-type, wire-wound potentiometer for use in military aircraft instrument circuits is being produced by

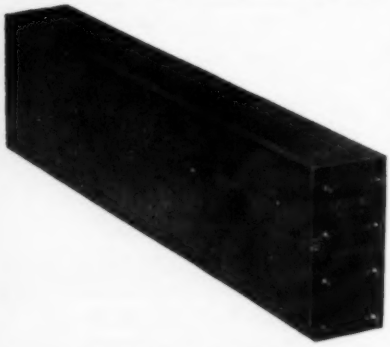
Maurey Instrument Co. The 3/4" diameter potentiometer is manufactured in standard values of 25, 500, 1K, 50K, and 100K ohms. A 5% resistance tolerance is standard with temperature coefficient of .00002 and a resolution of .1% available in the higher resistance values.

Construction includes case of high-tensile-strength aluminum, terminals gold plated, contacts of precious metals, and shaft and locating pins of 303 stainless steel. Designed to operate —65° to +125°C.

Circle No. 60 on Reader Service Card

Attenuation Delay Line

A general purpose attenuation delay line with a DC attenuation of 0.4 db



for a delay of 36 us and rise time of 0.36 us has been put on the market by Epsco, Inc. The Model DL-0600-03/120 is a 120 section lumped-constant line which can be supplied with taps every 0.3 us. Delay tolerance is ±3%, characteristic impedance 600 ohms, tap capacity 400 uuf, spurious reflections less than 3%. Size: 13¼" x 3" x 1½". Temperature range of —55°C to +125°C.

Circle No. 61 on Reader Service Card

Nutplate Drillmotor

A pneumatically operated drill designed to speed up countersinking operations in preparation for nutplate installation has been put on the market by Winslow Product Engineering Corp.

Manufacturer claims the new tool cuts drill-countersinking costs 90%, performing the whole operation in an average of 2-4 seconds. In operation, user inserts expanding type collet into hole to which nutplate is to be attached and pulls trigger. Tool clamping is automatic and drill countersinks to depth determined by hydraulic mechanism.

Circle No. 62 on Reader Service Card

Accelerometer

An air-damped accelerometer for jet aircraft and guided missiles has been announced by the Bourns Laboratories. The Model 602A unit offers stable damping characteristics from —65° to 200° F, within a rangeof 20 g's. Life expectancy is one million cycles.

The 602A weighs eight oz., measures 1¼" x 4⅛", and has a power rating of ½ watt at 160° F. Standard resistance values are 1000, 2000, 2500, and 5000 ohms.

Circle No. 63 on Reader Service Card

Parts Racks

A "Jumbo-Combo" rack for storing small parts in 67 bins of various sizes has been placed on the market by Service Parts Systems, Inc. The rack is 56" high, 42½" long, and 12" deep. Bins hang from nine cross-bars (see photo).

Also available from Service Parts are dust covers for bins, and a rolling storage rack which can accommodate 200 steel containers. These can be filled in the stock room, then wheeled out to reproduction areas where empty bins can be replaced with full ones without interruption of work.

Circle No. 69 on Reader Service Card

Boarding Ramp

A passenger boarding ramp which is adjustable through eight inches and which weighs only 1500 pounds has been put on the market by Phelps Manufacturing Co. The steps and platform are a single unit, which rotates about a pivot point as telescoping struts are

hydraulically lengthened or shortened. The steps and platform are tilted only 1½° from the horizontal during this process, an amount which is said to present no safety hazard. The unit, called the Stairway Junior, is currently being tested by American Airlines at Los Angeles.

Circle No. 72 on Reader Service Card.

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The "D" was the Air Force's first one-man all-weather interceptor. Capable of 650 m.p.h. plus speeds, it carries 24 Mighty Mouse rockets, each able to destroy any known type of bomber.

Latest in North American's famous Sabre family is the new F-86K, cannon-armed sister of the F-86D, which is now in production and will soon join NATO forces in Europe's air defense. Both the "D" and "K" are prime examples of North American Aviation's unsurpassed ability to design and produce the planes to meet America's defense needs.

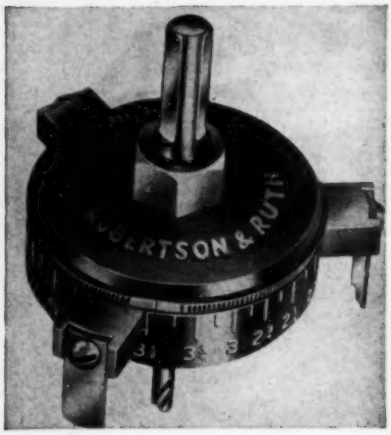
Research and development keep North American foremost in aircraft, rocket engines, guided missiles, electronics and peaceful applications of atomic energy.

ENGINEERING AHEAD FOR A BETTER TOMORROW

NORTH AMERICAN AVIATION, INC.

Hole Cutter

A new model of the Robertson and Ruth universal hole-cutting saw with increased cutting range is now available. The model 400 will cut any size hole from 1⅛" to 3½" in metals, wood, plastics, etc. A dial, calibrated in pipe and conduit sizes as well as in 1/8"

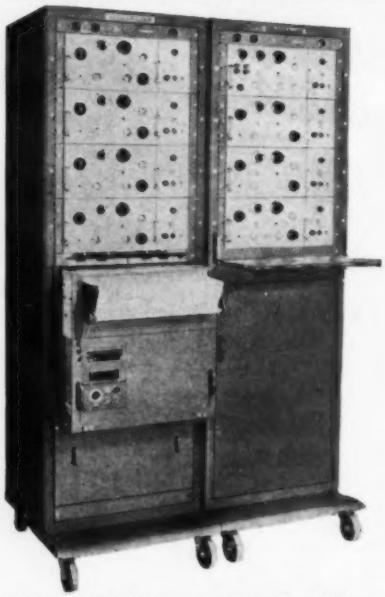


markings, is used to set the three high-speed steel cutting blades. It can also be used as a rotary planer, inlaying tool, or grooving tool, cutting any width groove from 1-1/8" up. Cutting depth of metal cutting blades is ⅜", the wood blades 1", metal and plastics ¾", and wood 2"

Circle No. 63 on Reader Service Card

Eight Channel Recorders

Six- and eight-channel models have been added to the Sanborn "150" oscillographic recording systems manufactured by Sanborn Co. The eight-channel system includes a Model 158-1100 mobile



cabinet containing an eight-channel recorder, a control panel and four Model 150-200/400 driver amplifiers with power supplies, a second mobile cabinet containing four additional driver amplifiers with power supplies, and a sliding shelf and cabinet space. The six-channel unit is essentially the same with fewer components. Interchangeable, plug-in preamplifiers make the whole series of single-, two-, four-, six-, and eight-channel systems adaptable to a wide range of recording requirements.

Circle No. 64 on Reader Service Card

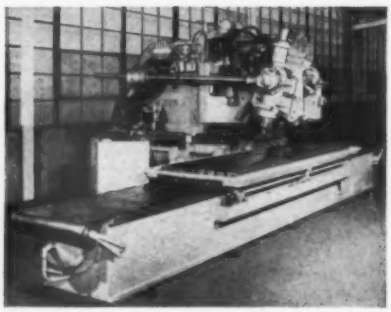
Sealed Relay

A new Type FC-6 six-pole, double-throw designed to withstand 0-2000 cycle vibration to 30 g and to withstand 60 g shock without contact opening has been introduced by Struthers-Dunn, Inc., Pitman, N. J. It is designed to exceed MIL-R-5757B and to meet MIL-R-25018 and MS-24115 specifications. Nominal coil voltage is 26.5 volts, d-c. Available in both 85°C and 125°C ambients.

Circle No. 65 on Reader Service Card

Contour Milling Machines

Two new milling machines, the R310 and CD72, have been introduced by the Bridgewater Machine Tool Co. The former has a rectangular work table up to 20 ft. long; the latter has a circular table 72" in diameter.



Tracing motions of the machines are guided by a plastic tape in the form of an endless belt, thus eliminating the need for a separate template table. Cutting the template form into the belt is done by the machine. Speeds of the machines range from 100 to 3000 rpm.

Circle No. 66 on Reader Service Card

Phenolic Adhesives

Two new adhesives designed to meet requirements of supersonic aircraft have been developed by North American Aviation Inc. "NAA Hi-Temp" is used for bonding metals and reinforced plastics; "CHT" is used in so-called sandwich constructions (see photo). In such construction, intermediate-strength aluminum honeycomb structure is bonded to high-strength aluminum facings. The Rubber and Asbestos Corp. and American Latex Products Corp. have been licensed to manufacture and market the adhesives.

Circle No. 67 on Reader Service Card

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6TH

ANNUAL
AIR TRANSPORT
PROGRESS ISSUE
APRIL 25, 1955

On April 25th, American Aviation's editors will present their sixth annual summary of the operations, airborne and ground equipment, engineering and maintenance of the three huge air transport systems: the world's airlines, the corporation aircraft fleets, the military "airlift."

1955 WILL BE THE BIGGEST YEAR YET IN TRANSPORT HISTORY—A YEAR OF CONTINUED GROWTH AND EXPANSION—A YEAR OF MORE NEW EQUIPMENT TAKING TO THE AIR!

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PROCUREMENT NOTES

LOOK FOR IMPORTANT developments in contractual and procurement policies for guided missiles. Secretary Wilson is reported concerned about duplication in missile development and contracting. The Army, Air Force, and two Bureaus in the Navy each have contracts for development and production. Some Pentagon officials expect a special group to be appointed to review possibilities for standardization and economy.

• •

IN A SURPRISE directive, No. 5160.4 Secretary Charles E. Wilson has turned over to Air Force Secretary Harold E. Talbott the responsibility of providing scientific and technical information and related services to all Defense agencies and contractors. Its purpose: "efficient interchange" of such data and "to promote progress and economy in research and development and to prevent duplication of such services." Mr. Talbott has assigned the task to Air Research and Development Command who expect to centralize all cataloging and distribution in Washington.

• •

SPELLED OUT for the first time in the latest draft of the new proposed cost allowance principles as reimbursable costs are all expenses such as meals, transportation, rental of facilities, etc., of meetings whose primary purpose is dissemination of technical information or the stimulation of production. It becomes part of the section which allows dues for trade and technical associations and subscriptions to trade and technical publications.

• •

THE RENEGOTIATION ACT expired on January 1, 1955, but the unpopular profit-limiting Vinson-Trammell Act automatically goes into effect. This legislation covers "manufacturers of naval vessels or aircraft, or any portion thereof." Aircraft firms are limited to 12% profit and the Treasury is already preparing forms for contractors to fill out. Finance officers should request from the Treasury copies of the Vinson-Trammell Act (as amended) and Treasury Decisions 4906 and 4909.

• •

INDUSTRY IS ANNOYED by the Air Force delay in accepting the principles of the new tax law for normal depreciation allowance. They still are continuing "straight-line depreciation." (This does not affect the status of allowance for true depreciation.) The "declining balance" principle of the new tax law has been written in the last draft of the new proposed cost allowance principles, Part 2, Section XV ASPR, although rumors are current that modifications are still being considered. Air Force officials state that they are following the orders of the Auditor General to continue the old method until there is a clear policy adopted by the Defense Department.

• •

THAT SECRETARY WILSON is determined to eliminate costly aviation engine project failures and "develop minimum number of engine types and sizes at least cost" is evidenced by a number of his recent actions. He dislikes the "present shotgun approach," has discarded the strong protests of the AIA, and has ordered his Asst. Secretary Ronald A. Quarles (research and development) to turn over all turbojet development projects to the new six man group under Asst. Secretary Frank D. Newberry. Mr. Quarles was known to be opposed to any program for standardization.

• •

THE PROPOSED CHANGES in Part 2, Section IX, of the Armed Services Procurement Regulations for "Copyrights and Technical Data," which were submitted to industry for comment, proved to be as controversial as their companion patent regulations (Part I, Section IX, ASPR.)

The Pentagon is now planning to hold open hearings before any final decision is reached.

• •

ROCKET ENGINE MANUFACTURERS are more critical of the Bureau of Ordnance because of its refusal to give private industry any worthwhile contract. The Bureau's Allegheny Ballistics Laboratory at Cumberland, Md., is going full blast with research, development and production work while newly expanded factories of private industry are in want for business.

New CAB Chairman Sworn In; Plans No Crusade on Personnel

The CAB is again functioning with a full five-man membership following the swearing in on March 1 of Ross Rizley, 62-year-old ex-Congressman, as a member and chairman.

The new Board Chairman, in an exclusive interview with AMERICAN AVIATION, said he has "no crusade to start" personnel-wise in CAB. But in the matter of CAB's relations with Congress and the White House, he was emphatic that CAB is "the creature of Congress" and that Congress is the policy-making body.

Rizley said he hopes to establish good relations with the executive and legislative branches and intends to keep both fully advised on aviation matters.

Rizley thus joined ex-Chairman Chan Gurney and Harmar D. Denny to form the Board's new Republican majority. Democratic members are Josh Lee and Joseph P. Adams.

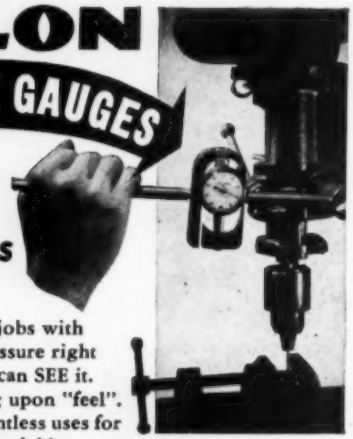
Engineering Changes Halt B-66 Production

Production of the Douglas B-66B and RB-66B bombers has been halted, presumably until sometime this summer, because of "aerodynamic difficulties." Flight tests revealed the difficulties and engineering corrections have already been achieved.

Effect on deliveries of the swept-wing jet bombers is expected to be small, since an accelerated production program is planned after construction is resumed.

DILLON

PRESSURE GAUGES



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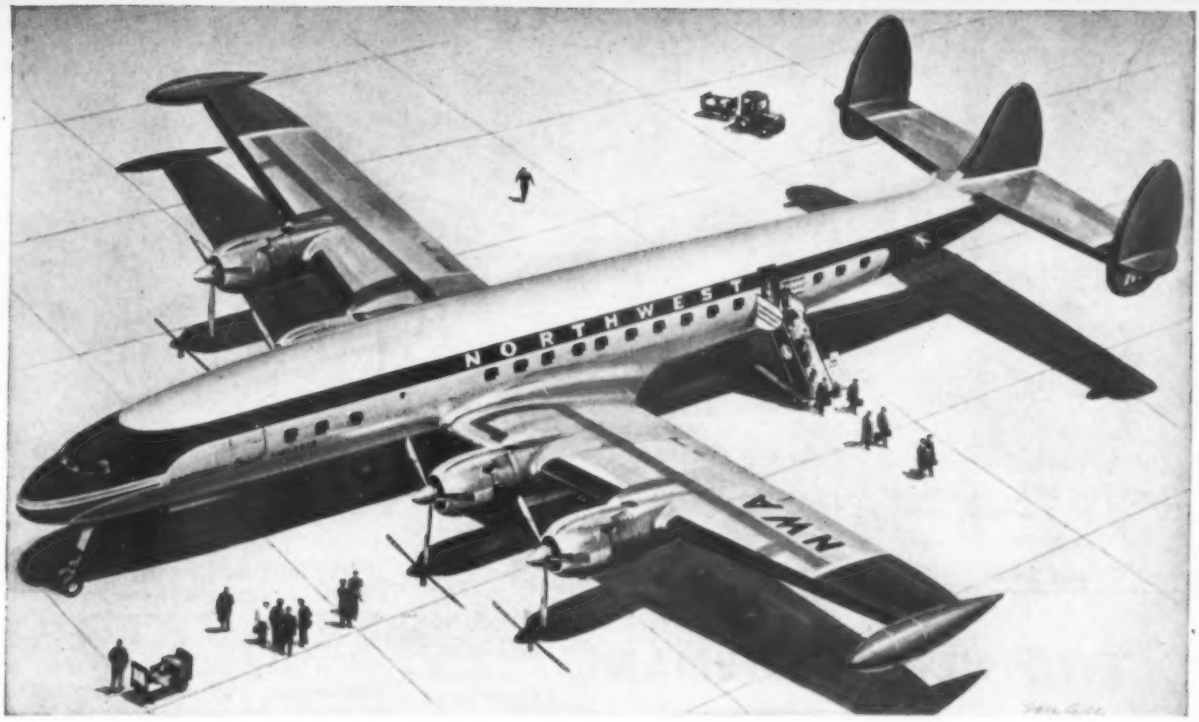

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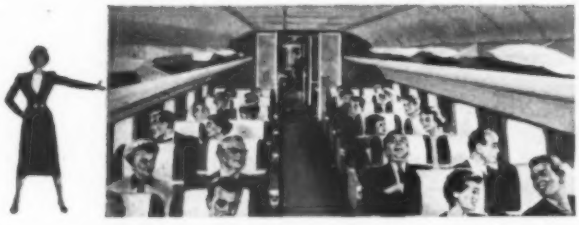

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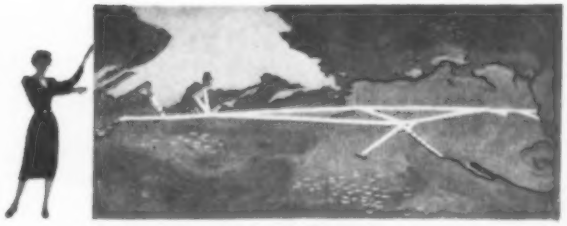

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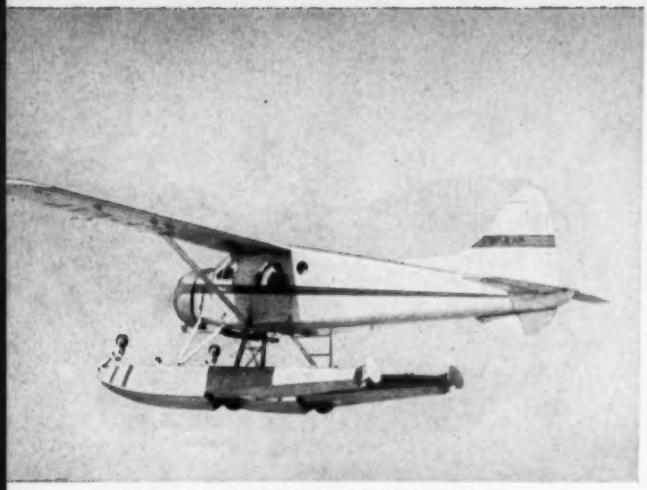


Amphibious de Havilland Beaver. Note position of retracted gear.

Amphibious Cessna 180. Main gear retracts in hydrodynamically static position.

aver and Cessna 249

TWO NEW AMPHIBIANS

TWO VERSATILE AMPHIBIANS have made their appearance on the market, the Cessna 180 and de Havilland Canada's Beaver. Both models use ERCO floats in combination with retractable gears. Edo Corp. at College Point, Long Island designed and built the floats for the Cessna while MacDonald Brothers Aircraft Co., Ltd. of Canada built the Beaver Edo type floats.

Edo is in production on the Cessna floats. CAA has certificated the float installation for both new and old aircraft.

The Cessna installation features two main wheels aft of the step in what is a dead spot hydrodynamically. This makes it possible to get away without doors and leaving the wheels partially exposed.

Two full swiveling Scott wheels are installed at the bows of the floats and retract upwards for water landing. All four gears operate from electro-mechanical power and use Electrol long-stroke shock absorbers. A landing gear signal system to warn the pilot of wheel position is provided.

Weight of the entire installation is 150 pounds over the conventional float installation. Several hundred take offs and landings have been made with the Cessna installation and established that no special flying technique is required.

De Havilland Aircraft of Canada, Ltd. is using the Edo 4580 float in combination with its regular landing gear to provide an amphibious plane. It suffers no measurable performance penalty. At gross weight, zero wind, the amphibian takes-off in 900 feet while the landplane is airborne in 700 feet.

The main gears of the Beaver installation are suspended below the floats aft of the step on levered rubber shock absorbers and retract into the floats.

Cessna's version uses electro-mechanically operated gear.

de Havilland's Beaver uses hydraulic jacks for gear retraction.

Close-ups of Cessna (left) and Beaver with gears fully extended give layout details.

TRANSPORT TRENDS Washington, D. C., March 14, 1955

DOMESTIC TRUNK ANNUAL SERVICE MAIL PAY appears headed for $5.6 million slash, cutting annual payments to about $26 million. On "open" rates since April 1, 1954, the industry is weighing proposed cut offered by the government as a possible settlement.

Proposal centers around a new multi-element rate structure (so much for transit and so much for station costs). It involves $2.4 million greater cut than CAB proposed in a show cause order last September. Board staff, which would not support the old CAB show cause proposal, says it is non-committal on new proposal. Post Office reportedly agreed "not to object" to a structure involving a $5.6 million cut in its bill.

Alternative for the airlines is about two years of litigation; most, however, are said to favor the reduction which will be fairly well distributed among the 12 lines.

ARMY'S AIRLIFT PROBLEM IS SCHEDULED for review by the Joint Chiefs of Staff at request of Gen. Matthew B. Ridgway, Army Chief of Staff. The JCS, not the USAF, determines the amount and calibre of lift made available to the Army.

There is increasing pressure to assure that the Army gets proper air lift support from the USAF or is given authority to provide its own. Army Secretary Robert Stevens has testified flatly that he is not satisfied with present air lift capabilities.

FOUR CONGRESSIONAL COMMITTEES ARE VYING to investigate the recent decision to adopt TACAN as the common system navigation aid in place of the VOR/DME system which has already cost the country close to $100 million. Efforts of VOR/DME supporters have moved the issue from the technical level to the political level.

Taking the lead, as of now, is the House Interstate and Foreign Commerce Committee which will investigate the implications of the decision on the whole common system. Senate IFCC is also at work on the problem. House Military Operations Subcommittee, which last year strongly criticized the USAF procurement of incompletely developed electronic equipment, will study the $325 million already committed for TACAN for signs of continuing shortcomings in this field.

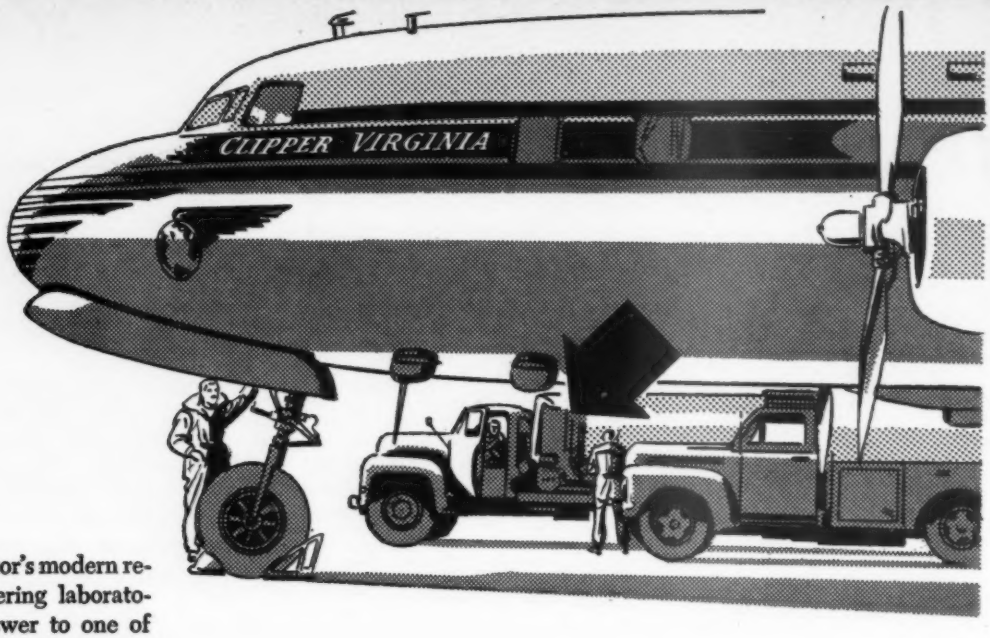
Pending developments in these groups, House Small Business Committee plans to get active on the subject sometime after Easter.

NEW YORK GETS ITS FIRST LOOK at the turboprop Vickers Viscount next week when Trans-Canada Air Lines has pre-inaugural showings. TCA starts Toronto-New York service with Viscounts April 4th, three days after inaugurating domestic services in Canada with its first six aircraft. Flying time: 1 hour, 35 minutes southbound; 1 hour, 50 minutes northbound. Montreal-N. Y. service will start in early May.

Date of arrival of Capital's first Viscount in the U. S. is still vague, mainly due to production line changes and acceptance test program. Late April is a likely date for local delivery.

By mid-summer British Overseas Airways Corp. will be flying Viscounts on the New York-Bermuda route. Planes will be those of British West Indian Airways which BWIA will fly twice weekly between Trinidad and Bermuda and BOAC will charter the planes to New York. Later BWIA will operate Viscounts between Miami and Jamaica.

TERMINAL ALLOCATIONS AT NEW YORK INTERNATIONAL Airport's multi-million dollar airline terminal may be due for a court review. National Airlines, dissatisfied with the space allocated for its terminal, may seek a court order to back up its priority argument for a more desirable spot. Appeal to Port of New York Authority has been turned down.



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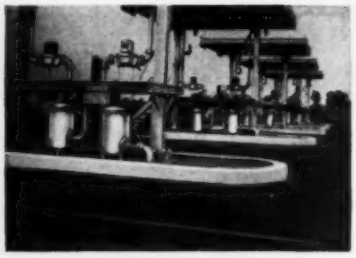

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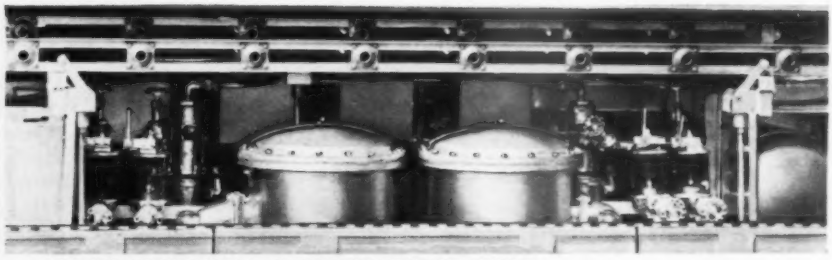

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Transport Aviation

CAB ESTIMATES $40 MILLION SAVINGS IN 3-YEAR PERIOD

By WILLIAM V. HENZEY

THE BIGGEST AND BEST change in the airline's subsidy picture since the "Big Four" became self-sufficient took place last month when the CAB announced that the $79 million total sudsidy bill would be pared to $61.6 million by fiscal 1956.

The Board also announced that the current year's bill, originally estimated at $79.4 million, will actually be much less when all figures are in, in fact, $13.2 million less. To further brighten the picture, the agency took a retroactive look and found that 1954's bill was not $80.4 million, as previous estimates showed, but actually $73 million.

In other words, the three years' savings are close to $40 million under previous estimates.

The favorable picture reflects a substantially-reduced need in the Atlantic and Pacific operations of U. S. flag lines. Trans World Airlines, the Board now notes, has been subsidy free in its international operations since fiscal 1953. Since TWA gets no subsidy domestically, it means the carrier is now in its third year of recognized self-sufficiency on its entire system.

• **Pan American World Airways** is now virtually free of subsidy in the Atlantic and will be off Federal aid in the Pacific for fiscal 1956. Northwest Airlines' Pacific services, according to CAB figures, will require less subsidy next year than some small domestic trunk carriers.

The significant development (foreseen in AMERICAN AVIATION, Jan. 3), stems largely from CAB's decision in the Trans-Atlantic Final Mail Rate Case and the decision to ship military mail via commercial air carriers instead of via military aircraft.

To reflect those two decisions, CAB departed from its method of publishing an annual subsidy separation report each September, and issued a February, 1955 version. Thus, the subsidy reductions cited reflect cuts from estimates made only six months ago.

With Congress about to consider appropriation requests for fiscal 1956, the CAB move assumes added importance. Last year, the first in which subsidy was an "open book" before appropriation committees, the international lines bore the brunt of criticism for the allegedly high-level of their subsidy. The major portion of an $80 million request was attributed to international needs said then by CAB to total approximately $46 million.

• **CAB's revised picture** this year will show that international operations require only $29 million for fiscal 1956, $16 million of which is earmarked for Latin American operations and about $8 million for Alaska and States-Alaska operations.

Also, the Board emphasizes the public will be getting more service for less money. Rates have gone down, volume of mail has gone up, and total cost to the government—service pay and subsidy—is lower.

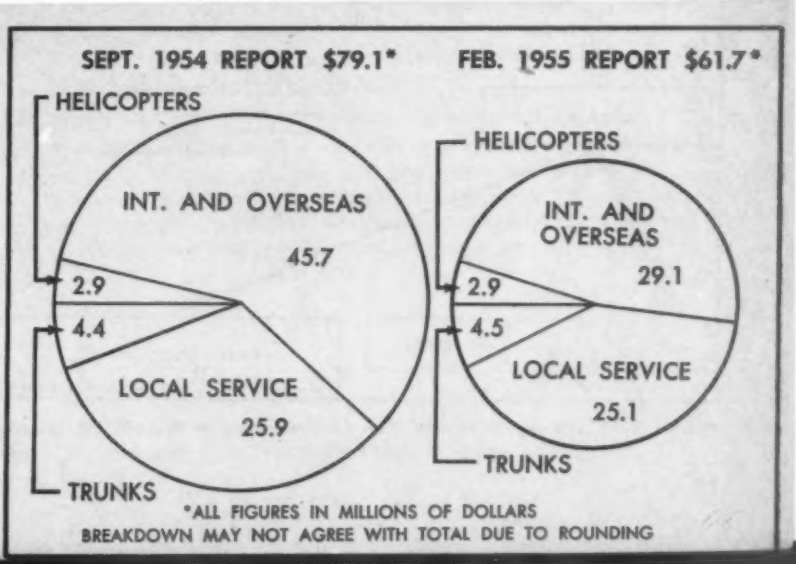
In 1954, 108,195,000 mail ton-miles were moved via U. S. air carriers. In fiscal 1956, CAB predicts 144,385,000 mail ton-miles will be carried. Also, where total cost of service pay and subsidy was $129,177,000 in 1954, it will be reduced to $127,891,000 in fiscal 1956.

• **The situation,** of course, is a prime example of how the Government can benefit from the unique subsidy-service pay set-up. A subsidy carrier will get a certain amount of fixed mail pay if it only carries one pound of mail. But for every dollar of service pay, there is a corresponding dollar reduction in subsidy.

Thus, if the Government is giving a carrier, for example, $5 million annually in total mail pay, $4 million of which is for subsidy, the Government actually has $4 million worth of service available to it for use at no extra cost.

This is precisely the situation in the Pacific where Pan Am and Northwest will get about the same total mail

Airline subsidies: Before and after CAB paring.



pay, but what was last year paid out as a subsidy, this year and next will largely amount to service pay for the military mail carried.

The only way the Government can wind up paying more than the originally-fixed total mail pay is where the volume of mail becomes so great that the service payments therefor wipe out the subsidiary allocation and exceed the estimated total of service pay and subsidy. But in such a situation the Government is getting service for every dollar spent and is paying no subsidies.

• **Bright as the new picture is,** however, there are several clouds of uncertainty in the future. First, CAB's decision in the Trans-Atlantic Rate Case has been contested by Pan Am and TWA raising the possibility, if not necessarily the probability, of a change.

Second, there is no accurate way of predicting how long the heavy volume of military mail will be available to the Pacific and Atlantic operators.

• Third, the domestic trunkline industry and all international U. S. airlines are on so-called "open" or "temporary" service mail rates and the final establishment of such rates could have an effect on the figures just released by CAB.

But until one or more of these developments materializes, and nothing is expected for at least one to two years, the U. S. airlines definitely have their best foot forward at a very crucial time. • • •

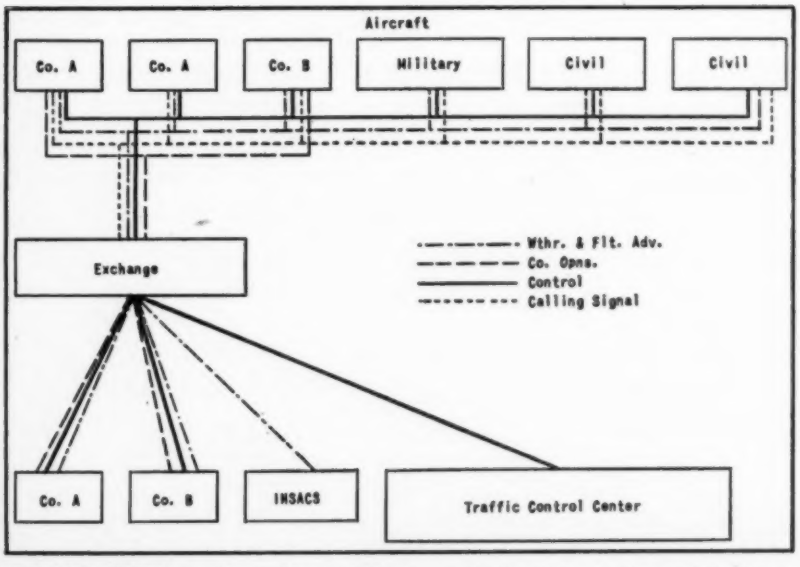
ATLANTIC:	1951	1952	1953	1954	1955	1956 Fiscal years
PAA	$9.87	$9.20	$8.89	$3.98	$2.56	$2.66
TWA	3.72	.86	0.00	0.00	0.00	0.00
AOA	1.75	.....	.....	.....	.....	.....
Totals						
New Est.	15.35	10.06	8.89	3.98	2.56	2.66
Prev. Est.	14.84	13.41	12.22	11.25	10.43	10.32
PACIFIC:						
NWA	2.99	3.41	3.89	3.87	2.17	1.48
PAA	7.77	8.22	8.28	7.76	3.28	0.00
Totals						
New Est.	10.77	11.64	12.17	11.64	5.45	1.48
Prev. Est.	10.77	11.64	12.22	11.56	9.78	9.71
INT. & OVERSEAS:						
Totals						
New Est.	39.67	42.35	46.09	42.03	33.52	29.11
Prev. Est.	39.17	45.82	49.47	48.89	46.04	45.76

BRIGHTER SUBSIDY picture is reflected chiefly in results of Atlantic and Pacific carriers as demonstrated by above figures which compare results estimated by CAB last September with those contained in new February estimate.

Arinc Studies New AeroCom Network

By JOSEPH S. MURPHY

THE vast aeronautical communications network in the U. S., which has literally "growed like Topsy" since its inception 25 years ago, may be in store for a major overhauling. Airline and government officials early this month began studying a proposal for a new multi-million dollar system which, if adapted, could handle more than double present-day communications traffic, demand fewer frequencies, and substantially reduce both capital investment in equipment and yearly operating costs.



ULTIMATE SYSTEM would provide a single communication route to the cockpit—via an exchange.

The proposal was submitted last week in a 70-page report by the consulting firm of Arthur D Little, Inc. of Cambridge, Mass. It was the outgrowth of a $60,000 study contract sponsored by Aeronautical Radio, Inc. and the Air Navigation Development Board (AMERICAN AVIATION, Dec. 6)

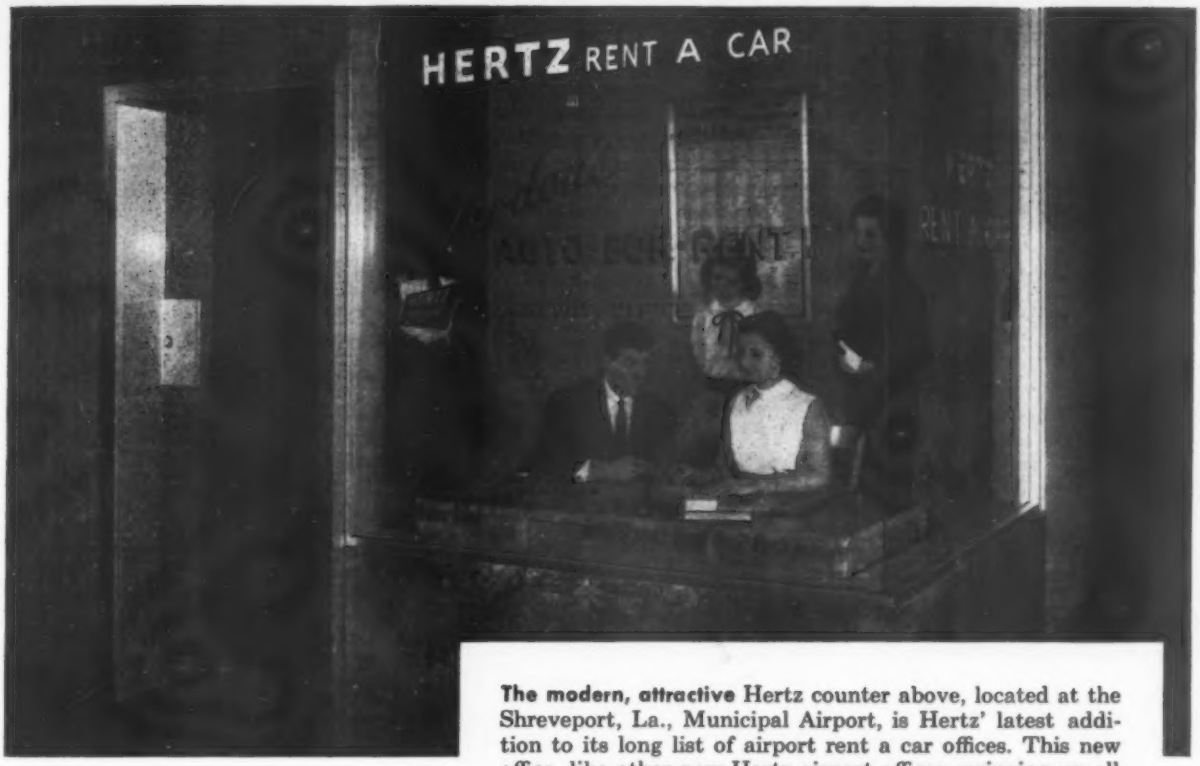
In releasing the Little report, Arinc president J. S. Anderson noted that the system it proposes would utilize skilled communications operators and technicians now available.

Although still just a proposal and not due to get any official consideration until a forthcoming Arinc stockholders and directors meeting on April 21, the report suggests this plan.

• **Joint implementation** by the air transport industry and CAA of a new common network of communications. Through an exchange type of system it would provide all channels for communication of traffic control, weather, and other flight information and air carrier operational communications.

• **Establishment of such a system,** first in the Boston-to-Washington area with later extension to other congested locations.

• **Joint exploration by air carriers and CAA** of the procurement of micro-wave services to handle point-to-point communications. Under maximum traffic conditions projected for



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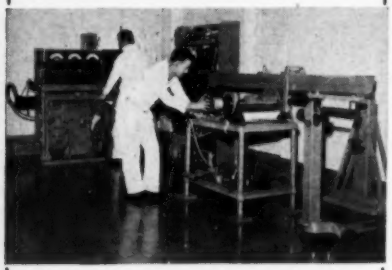

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1965, the consultants estimate, 40% of the combined circuit miles of the airlines and CAA could be replaced economically by microwave at a cost of $12.4 million and annual savings in user service costs of $4.7 million.

To get the program underway, it further suggests that the Secretaries of Commerce and Defense invite officials of interested federal and private agencies and companies to meet and form an Aeronautical Communications Advisory Committee.

This committee would also include the chief executive and several directors of Arinc and it would act in an advisory capacity only and would not have power to dictate policy to Arinc.

As to Arinc's current organization, these changes would be necessary to qualify it to operate the new program:

Charter revision to permit operation as a limited common carrier for aeronautical services.

Board of Directors reorganization to a composition of airline presidents or top management representatives. Such a group, the consultants feel, would be inclined to approve Arinc policies from a broad aviation viewpoint and avoid the pressures of short-term company problems when considering Arinc business. At least three other Board members, it suggests, could be elected from non-related industrial and financial groups to introduce outside business thinking and judgment.

Management would be empowered to make decisions and act independently within corporate policy and a budget approved by the Board.

Rate Schedules for services would be set up subject to approval of the Federal Communications Commission.

Basically, the so-called exchange system proposed by Little would operate very much like the present general home and business telephone service. In its most advanced form—which Little refers to as a Complete Exchange Network (see chart) there would be only one communication route into the cockpit, that via the exchange. As an added attraction, the exchange would provide a facility that could be readily expanded to include radiotelephone service for airline passengers.

In its operation, Little expects, an exchange would be installed in such a way that if an ATC controller calls an aircraft, the company dispatcher is also called and can overhear control conversations of interest to him. A desired feature of the system would be a signalling device to simplify the pilot's task by warning him of desired contact. However, the report states, this is not a necessity as the itinerant pilot could merely guard a signaling channel to be told when there is a call for him and what channel to use.

Here's how the Little firm sizes up the frequency requirements and economies of present and proposed systems for the northeast sector of the U. S.

	Minimum 1965 Traffic	Maximum 1965 Traffic
Frequencies Required		
Current Network	130	182
Complete Exchange	68	102
Capital Investment		
Current Network	$3,200,000	$3,400,000
Complete Exchange	$700,000	$800,000
Annaul Operating Cost		
Current Network	$2,500,000	$2,600,000
Complete Exchange	$800,000	$1,100,000

NEW BILLS IN THE NEW CONGRESS

AS PROMISED by Sen. Warren G. Magnuson (D-Wash.), chairman of the Senate Commerce Committee, draft legislation further amending the Civil Aeronautics Act of 1938 has been introduced by the Washington Senator and constitutes the major aviation legislation filed in the past weeks.

The bill, S.1119, contains upwards of 50 changes in the 1938 act and updates the old measure to rename it the "Civil Aeronautics Act of 1955." In fact, most of the new legislation recorded amends the 1938 act in one way or another.

Aviation bills introduced since Feb. 17, by number, subject matter, and authors, are as follows (for earlier bills see AMERICAN AVIATION, Feb. 28):

H. R. 4310 Amends section 401 (e) of the Civil Aeronautics Act, as amended. Includes helicopter services, along with local service carriers, as candidates for permanent certification. ...Rep. Hinshaw (R-Calif.)

S. 1109 Amends subsection 401(e) of the Civil Aeronautics Act of 1938, as amended, to permanently certificate local service air carriers. .....Sen. Bricker (R-Ohio)

S. 1119 To amend the Civil Aeronautics Act of 1938, as amended, and for other purposes. Makes upwards of 50 changes in the basic act and carries additional amendment setting up new class of "supplemental service air carrier's (non-scheduled) and defining type and extent of such service on certificate. .....Sen. Magnuson (D-Wash.)

S. 1192 To amend the Civil Aeronautics Act of 1938 to exempt operations in the transportation of livestock, fish, and agricultural, floricultural and horticultural commodities from the Act and from regulation by the Civil Aeronautics Board thereunder. Gives agriculture and florists the same exemptions from regulation by the CAB as is granted the industries from regulation by the Interstate Commerce Commission by the agricultural exemption in the ICC Act ..Sen. Magnuson (D-Wash.)

Recent CAB Decisions

Agreements between Airwork, Ltd., on one hand, and Transocean and Slick, on other, under which the U. S. lines will furnish aircraft, etc. for Airwork's trans-Atlantic cargo service, approved.

Proposed reduced eastbound directional cargo rates of seven carriers (AA, CAP, NWA, SLI, TWA, and UAL), suspended for 90 days pending investigation.

National Airlines' granted one year extension from March 1, 1955 for trial helicopter operations in Miami area.

Compania Cubana de Aviacion, S. A. recommended for amended New York-Havana foreign minus original conditions attached by CAB with respect to Cubana's affiliation with Pan American.

Pending Cases

Biggest news in this field is new Chairman Ross Rizley's declaration of open warfare against the Board's big back-log of cases. Rizley's determination plus a Congressional invitation to ask for more money if needed to get the job done, could signal an era of stepped-up activity in the procedural field.

Meanwhile, CAB staff people are meeting with airline mail rate experts in a new effort to avoid the two years of litigation with the **Domestic Trunklines Service Mail Rate Case** promises. Board has a revised multi-element structure which it hopes will be acceptable to the industry and PO. If so, the lengthy case could be settled before it starts.

Despite these efforts to speed, however, the dragged-out **States-Alaska Case** is not near settlement. Rizley intends to take part in the case and indications are new votes will be taken on all issues. Since the record in the case is lengthy, it could some time before the Board again gets around to a vote.

CAB Applications

Braniff Airways applied for authority to suspend at Rockford, Ill., on March 10, when Ozark Airlines service was scheduled to start to that point.

Trans-Pacific Airlines asked to be included in new local service regulation which permits carriers to exchange air transportation for advertising.

Northwest Airlines has applied to eliminate Miles City, Mont. from its certificates for Route 3.

CAB Calendar

Mar. 14—Hearing, Domestic Trunklines Mail Rate Case. Washington, D. C. Docket 6599 et al.

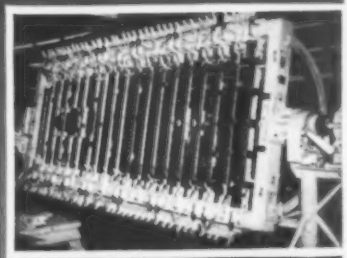
Mar. 15—Hearing, Pan American—LACSA Control Case. Washington, D. C. Docket 6594.

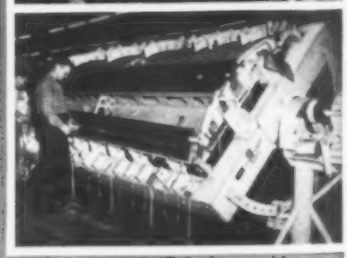
Mar. 15—Oral Argument, Jamestown, N. D. Suspension Case (Northwest Airlines). Washington, D. C. Docket 4773.

Mar. 22—Hearing, Helicopter Air Service Renewal Case. Tentative. Docket 6600.

Mar. 22—Hearing, Ciudad Trujillo-New York Nonstop Case (Pan American). Washington, D. C. Docket 6151.

Apr. 5—Hearing, Midet Certificate Renewal Case. Washington, D. C. Docket 6743.





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Idlewild to Have a "Terminal City"

• Port Authority begin $60 million building program this year.

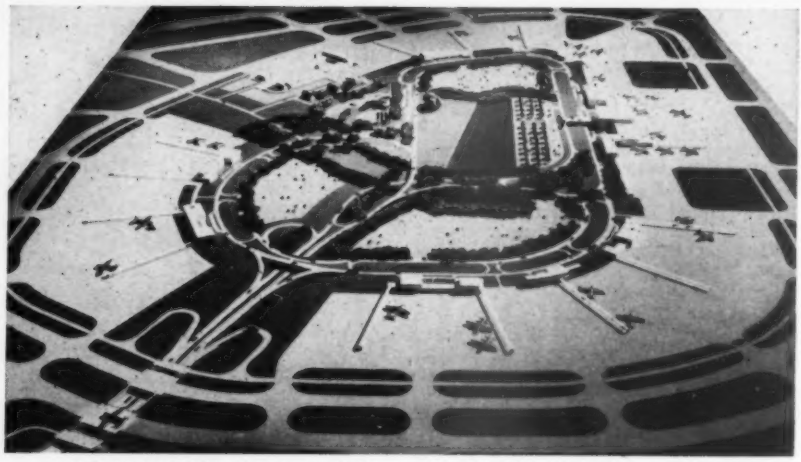
PLANS FOR A NEW terminal area at New York's International Airport, large enough to contain all of La Guardia Airport with 105 acres left over, have been announced by the Port of New York Authority. Into a landscaped oval of 655 acres will be set 10 terminal buildings, a reflecting pool, roadways, the existing 11-story control tower, and enough parking area for 6000 automobiles.

The terminal buildings will be spaced out around the periphery of the park-like area, with seven U. S. carriers occupying their own terminal buildings and the foreign flag airlines grouped two wings jutting out from the main Arrival Building. In this building all incoming international passengers will pass through Customs, Immigration, and other Federal processing. Domestic passengers will arrive and depart through the smaller terminals of the individual airlines.

Construction of the $60 million project will begin this year. The Arrival Building and its two adjoining Airline Wing Buildings for the foreign carriers should be completed early in 1957.

Gate positions for as many as 32 planes will be provided at the Arrival and Wing Buildings. The individual terminals will provide either eight or 16 positions each, bringing the total to 140. At present only 29 positions are available at Idlewild, 18 at La Guardia, 16 at Newark.

PRESENT CONTROL TOWER will be linked to Arrival Building with promenade.



ARRIVAL BUILDING is centered along right edge of landscaped area, above.

The use of separate terminals for the various airlines reflects the fact that if a single building were designed to provide 140 gate positions it would have to be two miles long. Sixteen-gate terminals are scheduled for American, Eastern, Pan American, Trans World, and United Air Lines. National and Northwest Airlines will have eight-gate units. Twelve additional positions are allowed for expansion.

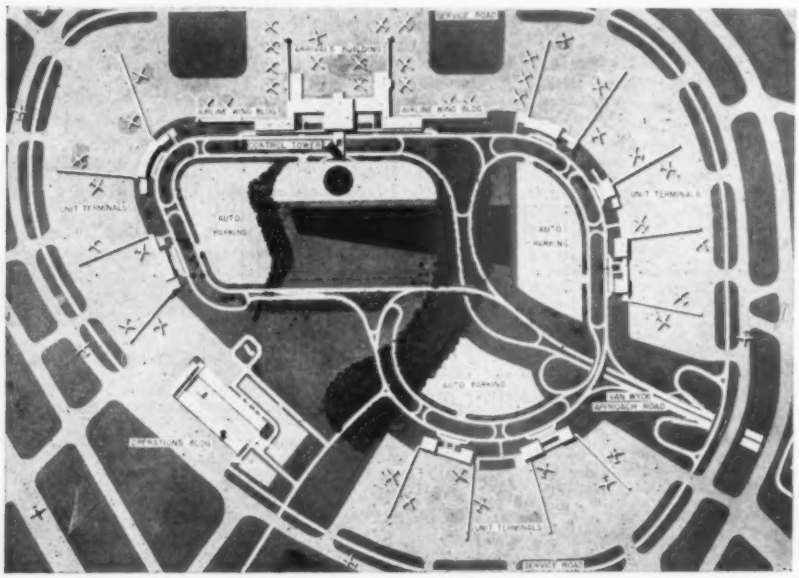
Since the PNYA estimates that only five per cent of the passengers will be transferring from one carrier to another, the distances between terminals necessitating bus service are not expected to pose a problem.

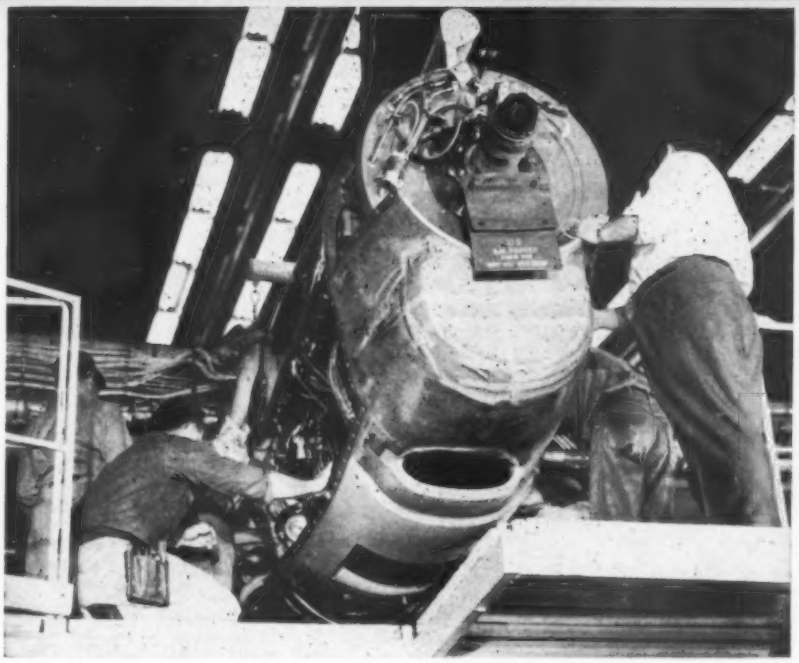
Each 16-gate terminal will have approximately 105,000 square feet of floor space on a 22-acre site. The Arrival Building, three stories tall, will be more than twice as large, with 227,500 square feet of floor space.

The proportions of the so-called "Terminal City" were dictated by the traffic expected by 1956. By that date 8½ million passengers are expected to use the airport annually, almost three times the 1954 traffic. Each of the seven terminals will then be handling more than the airport did in 1950.

The International Airport terminal plans were developed by the PNYA staff, in collaboration with the architectural firm of Skidmore, Owings, and Merrill.

UNIT TERMINALS for airlines will surround parking areas for 6000 automobiles.





Actual installation includes lining up attach bolts and making control connections.

Prior to installation, the T56 power egg is weighed.

Turbine Installation in 30 Minutes

ONE OF THE long standing claims of turbine engine manufacturers is that engine change with the new type powerplants is vastly more simple than with piston engine aircraft. In the accompanying photographs, production workers at Lockheed-Marietta demonstrate that the claim is valid.

From the time the Allison T56 (for further information on the T56 see page 25) was rolled up to the production C-130A until installation was completed, a mere 30 minutes time elapsed. This included removing the Rohr built power package from the dolly, weighing it, mounting the engine to the firewall, and making the fuel, oil, electrical and control connections. Nineteen of the 30 minutes were used in actual mating of the engine and airframe, the remainder for hoisting, weighing, etc. • • •

Complete installation, minus propeller.

Helioplane Production Now Underway; First "Courier" Model in April

PRODUCTION OF THE VERSATILE stall-proof 4-place Helioplane is now fully assured and production is underway with the first model due off the assembly line next month, it has been learned.

Helio Aircraft Corp., Norwood, Mass., has entered into a three-year contract with Mid-State Manufacturing Corporation, Pittsburg, Kansas, to produce the all-metal airplane to be called the "Courier," and work has been underway for several months.

Mid-States is a wholly-owned subsidiary of McNally Pittsburg Corp., a long-established manufacturer of industry and mining equipment, and has been engaged in subcontracting for the aircraft industry for some time.

Helio Aircraft Corp., retains all proprietary rights to its airplane and will maintain engineering supervision at the Kansas plant. The Norwood offices and plant will continue engineering and design developments. The contract with Fleet Manufacturing Ltd., Fort Erie, Ontario, Canada, giving Fleet production and sales rights for Canada and the British Commonwealth, remains in force. Mid-State, meanwhile, has allocated substantial financial resources to the U.S. production, with a goal of 50 airplanes for this year.

The Helioplane was designed by two professors after the war, Dr. Lynn L. Bollinger, then professor in charge of aviation research at Harvard Business School, and Prof. Otto C. Koppen, in charge of aeronautical design at M.I.T. Dr. Bollinger is president of the corporation and devoting his major time to it. The original Helio Corporation in 1948 became Helio Aircraft Corp. in 1950.

The Helioplane has attracted much interest, but initial production plans were halted by the Korean war. It will sell for $24,500 flyaway, has a minimum fully controllable level flight speed of 30 mph and optimum cruise at 8,500 feet and 72% of power of 157 mph. Takeoff and landing with no wind and four occupants is within 75 yards, or 165 yards over a 50-foot obstacle. It has a range of 600 miles with 60 gal. fuel capacity, and is powered with a 260 hp geared Lycoming. Six models produced at Norwood are currently flying. The craft includes many safety features. • • •

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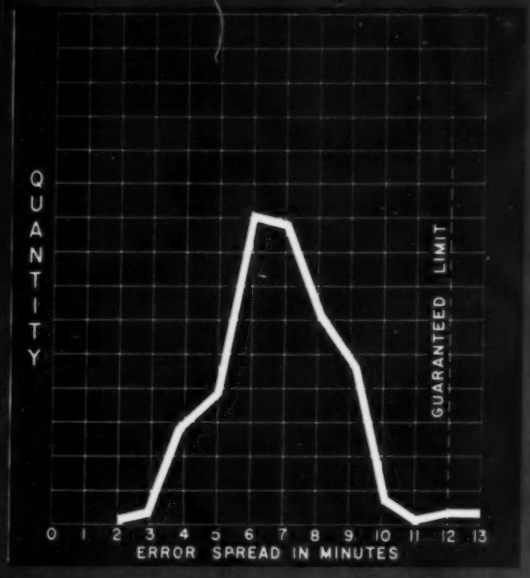

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Technical Literature

CONTOUR MILLING MACHINES. Construction and operation of two new models are explained in eight-page booklet by Bridgewater Machine Tool Co.
Circle No. 80 on Reader Service Card.

SIMULATOR INSTRUMENTS. Four-page leaflet from Link Aviation outlines uses of instruments for simulators.
Circle No. 81 on Reader Service Card.

TESTING ELECTRIC MOTORS. General Electric test laboratory for aircraft motors is described in four-page booklet.
Circle No. 82 on Reader Service Card.

SUBCONTRACTOR. The facilities and the line of valves produced by the Mack Equipment and Machine Co. are outlined in eight pages.
Circle No. 83 on Reader Service Card.

SERVOS. The components and the advantages of the "A" series range servo produced by Servomechanisms, Inc. are described in 32 pages.
Circle No. 84 on Reader Service Card.

RETAINING RINGS. The Waldes Kohinoor retaining ring catalog has been updated by issuance of an eight-page supplement.
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COLUMBUS ENGINEERING CO. The newly enlarged facilities of this firm are described in an eight-page illustrated brochure.
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SCREW-LOCK INSERT. Two new sizes and other technical data on its new screw-lock insert are described by Heli-Coil Corp. in a revised bulletin.
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TUBING. Specifications of various types of tubing produced by Superior Tube Co. are listed, with typical applications, in an eight-page bulletin.
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POROUS FILTER. Technical data on the filtering properties of porous "Teflon" are presented in a leaflet published by Porous Plastic Filter Co.
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FORGINGS. Forgings catalog and engineers handbook is available from Scovill Manufacturing Co.
Circle No. 90 on Reader Service Card.

SWITCHES. Twelve-page catalog of subminiature and other switches has been compiled by Micro Switch, division of Minneapolis-Honeywell Regulator Co.
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FACILITIES. Production facilities of five plants of Avien Inc. are described in a two-color, 16-page booklet titled "Precision Defined."
Circle No. 92 on Reader Service Card.

COUPLINGS. Varieties of joints for fuel, oil, pneumatic lines, etc., are illustrated in a bulletin published by E. B. Wiggins Oil Tool Co.
Circle No. 93 on Reader Service Card.

CORRECTION

ELECTRONIC DICTIONARY listed in Dec. 20 issue is 72-page (not 782) booklet defining over 3500 electronic terms. Price 25 cents. Address requests to Allied Radio Corp., Chicago 80, Ill.

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WHO FAVORS RECONFIRMATION?

• Airlines decide by mail whether to abandon controversial Reconfirmation Rule

By ERIC BRAMLEY

DOMESTIC AIRLINES were to have completed voting on March 12 on whether to kill the controversial reconfirmation rule, and the results are expected to be announced shortly.

The vote, conducted by mail through the offices of the Air Traffic Conference, was requested by American Airlines, which has spearheaded a drive to eliminate the rule. A majority (at least 16 of the 31 ATC members) is needed to rescind it. Any airline not casting a vote within the prescribed 15-day period is counted as having voted affirmatively.

If American's campaign is successful, reconfirmation will be removed from the books on June 15, 1955. If it is unsuccessful, the subject is certain to come up again at ATC's spring meeting in May.

• **American's** request for a mail vote came shortly after C. R. Smith, AA president, reiterated his opposition to the rule and his support of a penalty system on first-class flights as well as coach. Airlines have "not had the courage to put in this sensible (penalty) system . . . Instead they instituted the half-way measure of . . . reconfirmation," he said.

Other recent developments included statements by:

C. R. Speers, AA's senior vice president-sales, commenting on an article in AMERICAN AVIATION, asserted that reconfirmation is "illogical and contrary to the principles of good salesmanship." Copies of Speers' letter to AMERICAN AVIATION were sent by AA to ATC members.

Bernard DeVoto, editor of the "Easy Chair" column in *Harper's*, called reconfirmation an "asininity."

• **In a letter to Time Magazine,** which had reprinted portions of DeVoto's article in *Harper's*, Smith agreed that reconfirmation is an "asininity," and added that "the only remedy is a penalty system for those who abuse the privilege of making reservations . . . The reconfirmation policy is a proven failure and should be abolished, yet the members of the Air Transport Association . . . have consistently voted to retain it, and a minority group, which includes American Airlines, has not yet been able to have it abolished."

SMITH

SPEERS

Speers, commenting on an AMERICAN AVIATION article (Jan. 17) on no-shows, asserted: "We sell the customer our product. He pays for it, and picks up his contract of passage. But we say to him that he must again assure us that he wants the product, and, indeed, will refuse to let him have it if he does not call again."

The AMERICAN AVIATION article had reported that airlines lost $5,599,200 revenue from no-shows in 1954, but that it was probable that a substantial part of the loss was due to clerical and paperwork errors by the carriers and was not the fault of the passengers.

Said Speers: "A no-show is a man who makes a reservation that he neither uses nor cancels. At least that has been the popular conception . . . But now we are told that part of the so-called 'no-show problem' has consisted of bookkeeping errors on the part of the airlines. It is mostly at this part of the problem that reconfirmation is aimed.

• ". . . **How much more money** do you put in the till when you find out about some of these 'paper' errors through reconfirmation? A bookkeeping error canceled out through reconfirmation procedures means no more money in the till unless (1) the flight is already fully booked, and (2) there is a waiting list demand (standbys don't count).

"How often do all these circumstances occur simultaneously? Even airlines with a high passenger load factor experience a very small percentage of flight departures with every single passenger seat filled on the reservations charts and with an unaccommodated waiting list.

• **Looking at reconfirmation** from the passenger's point of view, "what do you think of an airline rule that puts you to a lot of trouble and inconvenience, when the airline frankly admits the rule is devised to cover up the airline's own errors? . . . It does nothing to prevent errors but, in fact, encourages them . . . Unless we eliminate reconfirmation, we will certainly reap a bumper harvest of passenger ill-will."

Speers added that "reconfirmation encourages the passenger . . . to neglect to cancel his reservation when he changes his mind, because the airline has told him it will cancel his reservation automatically if he does not reconfirm. This is inconsistent with the plea that we have made to all passengers for years—please cancel your reservation if you don't intend to use it.

"Reconfirmation imposes an unnecessary burden on the passenger—the passenger who plans to *use* his reservation, not the passenger who no-shows."

• • •

Lockheed 1549 in Doubt

FUTURE OF the Lockheed Model 1549 turboprop transport now hangs on the issue of Pratt & Whitney's development program for the 6,000 horsepower T34 engine. The big question is whether the engine's specific fuel consumption can be reduced to acceptable commercial standards and the surging problem at altitude corrected in time to guarantee 1549 deliveries while a turboprop retains its competitive advantages.

Lockheed reportedly has a commitment from TWA for 20 Model 1549's providing performance and delivery promises can be met. In discussions between Robert E. Gross, president of Lockheed Aircraft Corp., and W. P. Gwinn, general manager of P&W, the engine company official is said to have assured Lockheed the corrections can be made but the time-table for these corrections will have to await results of the study.

If T34 development cannot meet the required schedule, Lockheed may offer a new design based on the Allison T56 engine. Alternatively Lockheed may renew development emphasis on the turbojet L-193.

Apparently all of Lockheed's transport development activities will be influenced to some degree by the Air Force Phase I jet tanker award to Lockheed-Marietta (see page 23) earlier this month.

• • •

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TRANS-CANADA AIR LINES

One of The World's Great Airlines

BOAC Buys DC-7's: Fills Equipment Gap Until 1960

By ANTHONY VANDYK

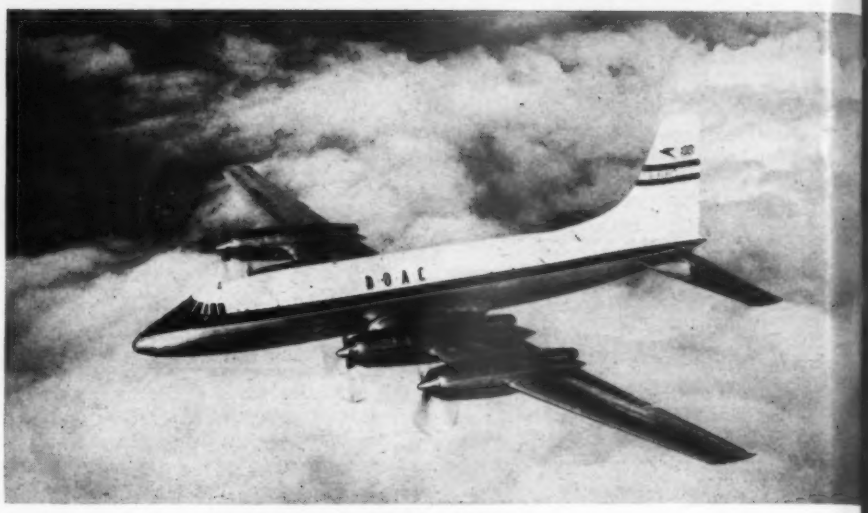
AMERICAN AIRCRAFT will continue to be the mainstay of British Overseas Airways Corporation's fleet for this decade but by the early 1960's the airline should be operating an all-British fleet of turbine transports. This is likely to prove the most important of a series of decisions regarding the future of the Bristol Britannia and the de Havilland Comet taken in Britain last month. Here are the decision in detail:

• **BOAC is to operate** a fleet of 20 "New Comets" (probably Comet 3's modified to incorporate the recommendations of the inquiry into the 1954 Comet 1 accidents).

• **The Royal Air Force's** Transport Command is to be equipped with some modified Comet 2's while the Ministry of Supply will take over some of the 12 existing Comet 1's for research and development work.

• **BOAC is to increase** its Britannia order by 10 aircraft (Britannia 300LR's for transatlantic operation) bringing it to 33 (fifteen 11's, eight 300's and ten 300LR's), and will order 60 BE25 advance-model turboprops for eventual re-engining of the 300LR's.

• **The second source** of Britannia production, Short Bros. & Harland's Belfast plant, is to go ahead with its program as a result of a Ministry of Supply order for three combination passengers, freighter-type Britannia 250LR's; these will either be operated by RAF Transport Command or will be leased to British independents. Short's will build an additional five 250LR's in anticipation of more orders.



BOAC has ordered 33 Bristol Britannias

• **BOAC is authorized** to order 10 Douglas DC-7C's but British government permission is conditional on the airline selling the American aircraft as soon as the Britannia 300LR is in passenger-carrying transatlantic service; DC-7C deliveries to the British airline will probably start late next year.

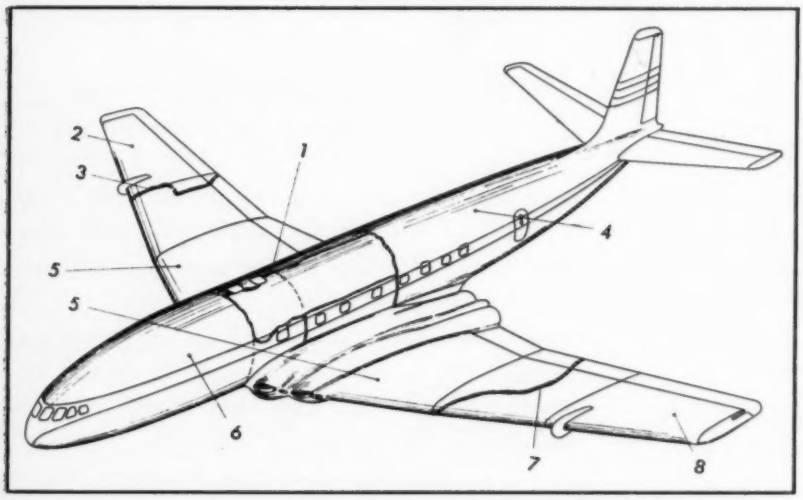
As a result of these decisions the future is considerably brighter for the British aircraft industry and BOAC than it was at the end of last year (AMERICAN AVIATION, Jan. 3). Nevertheless, there are still plenty of problems ahead for de Havilland and Bristol. Both companies have received the support that they had right to expect from their own country, but the overseas market is still a big question mark.

For de Havilland the first task is to canvass those companies that have already ordered the Comet 2 and 3 to see whether they are prepared to accept a modified, superior model considerably later than the delivery dates agreed for the original aircraft. Among the original customers that still seem as Comet-loyal as ever are Canadian Pacific Airlines and Panair do Brasil. PAA, Japan Air Lines, Air-India International, Linea Aeropostal Venezolana and Qantas Empire Airways (which "inherited" the BCPA Comet order) reportedly are less enthused.

• **The two original** foreign commercial operators of the Comet, Air France and UAT-Aeromaritime, are currently most concerned with what type of compensation they can receive from de Havilland for the losses they incurred through the grounding of the Comet 1. When they receive satisfaction on this score they will be prepared to take a position regarding the acquisition of more advanced models of the British jetliner. Present indications are that neither French company is likely to renew its contracts for additional Comets.

Bristol's position is in a sense worse than that of de Havilland insofar as there are no overseas orders for the Britannia. Qantas Empire Airways was once interested in the Proteus-Britannia but latest word from the Australian company is that it wants

LOCATION AND DIRECTION OF MAIN COMET FAILURES



1. Center fuselage. Split along top center line through A. D. F. aerial windows and opened outwards. 2. Starboard outer wing. 3. Separation of center action and outer wing wreckage. Main failure occurred between ribs 12 and 13 in a downward direction. 4. Rear fuselage and tail unit separated at rear spar attachments in a downward direction. 5. Wing center section complete with engines and undercarriage. 6. Front fuselage separated at front spar attachments in a downward direction. 7. Separation of center section and outer wing wreckage. Main failure of port wing not recovered. Failure probably in downward direction and roughly symmetrical with starboard wing failure. 8. Port outer wing.

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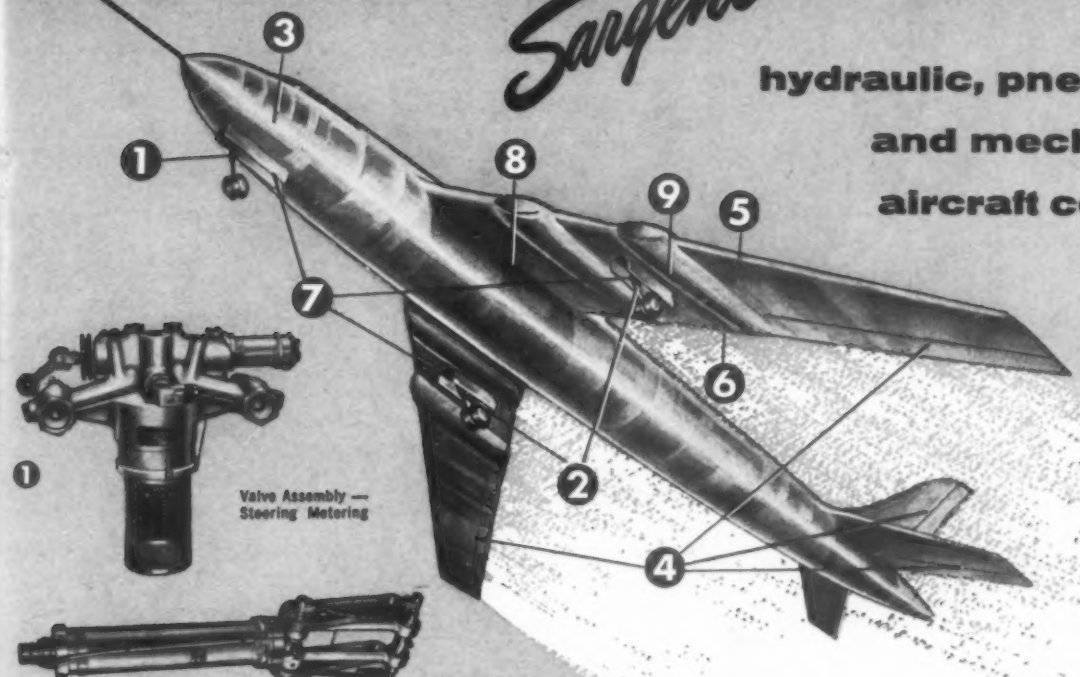
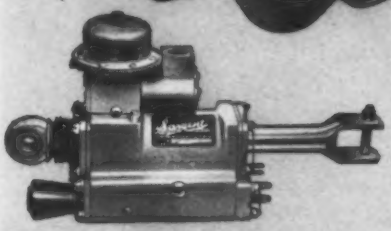


1 Valve Assembly — Steering Metering

2 Main Landing Gear Retractor

3 Brake Valves



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"Good will" is the disposition of the pleased customer to return to the place where he has been well treated.
—U.S. Supreme Court

the Britannia 250LR with BE25's for service in 1959-1960. It seems unlikely that there will be any firm overseas orders for the Britannia until the aircraft has proved itself in passenger-carrying service with BOAC, although Bristol is now tempting customer with guarantees on performance, engine maintenance and overhaul costs, and delivery dates; it is understood that Bristol is guaranteeing a 30,000-hour minimum airframe life for the Britannia.

• **Because of overseas sales,** much hinges on the success of the Britannia and Comet 3 in scheduled passenger-carrying service with BOAC also, there is tremendous interest in the dates when the two planes may start carrying revenue passengers. In the case of the Britannia the position is fairly clear. Bristol is hoping to get a full certificate of airworthiness for the Britannia 100 this summer. By then 4000 hours of flying should have been completed with the prototype and the first three production aircraft. Once the Britannia is certificated BOAC plans to fly it in non-passenger carrying service for several thousand more hours. If all goes well the Britannia 100 could enter passenger-carrying service by the beginning of 1957.

Much more difficult to forecast is the year when the Comet 3 will be in passenger-carrying airline service. After the aircraft has been redesigned there will have to be thorough prototype tests, including a full series of repeated pressure tests. The de Havilland Company will have to fly the aircraft for many thousands of hours before offering it for certification. Once certificated, BOAC will require many thousands of hours of service tests and route familiarization flying before allowing passengers to be carried in the Comet.

• **Because the inquiry** found the 1954 Comet accidents were caused by structural failure of the pressure cabin brought about by metal fatigue, redesign of the Comet 3 will be aimed at preventing such occurrences. The test program, in its turn, will have the primary purpose of checking that the redesign work has been successful.

The following are some other design features of the Comet 1 which may have to be changed before Britain's Air Registration Board will certificate the Comet 3:

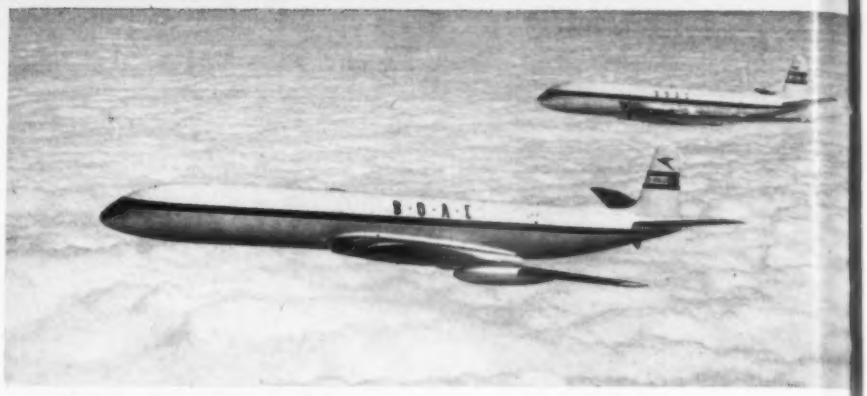
(1) Unsuitable airfoil section. Working from German data, a symmetrical high-speed profile with bad stall characteristics was chosen when the Comet was never likely to exceed Mach .75. Thus, all the take-off trouble arose from an anti-drag feature that was unnecessary since the 11%, 20 deg. wing was sufficient.

(2) The fuel system permitted structural damage by over-filling, and venting of fuel vapor into the area near the jet pipes.

(3) The proximity of high-pressure hydraulics and electric cables made explosion at altitude a possibility if simultaneous leak and short circuit occurred.

(4) Lack of control feel and high break-out force was not liked by pilots. The manufacturer is not wholly to blame for the latter since the Air Registration Board asks for stickfree stability; many consider this an anomaly with powered or boosted controls.

• **Inevitably the modification,** testing and proving of the Comet 3 is going into years rather than months. Yet time is a vital factor for the de Havilland jetliner in view of the imminence of Boeing 707 production and the steady progress that is being made on the Vickers 1000 — it probably will fly this year. Both these aircraft are larger than the Comet 3. Quite apart from performance considerations it would seem that de Havilland is going to have a difficult time selling its older, smaller type of jet transport in the face of such powerful competition. Nevertheless, the fervent determination of Britain to "make a go" of the Comet should not be underestimated. The final chapter of the Comet story is a long way from being written. • • •



Comet 2 and 3: RAF Transport Command will operate the former, BOAC the latter.

Senator Magnuson Says:

WE'RE GOING to go into the matter of separating the functions of the legislative department from the executive department," Sen. Warren G. Magnuson (D-Wash.), chairman of the Senate Commerce Committee, told AMERICAN AVIATION in an exclusive interview.

MAGNUSON

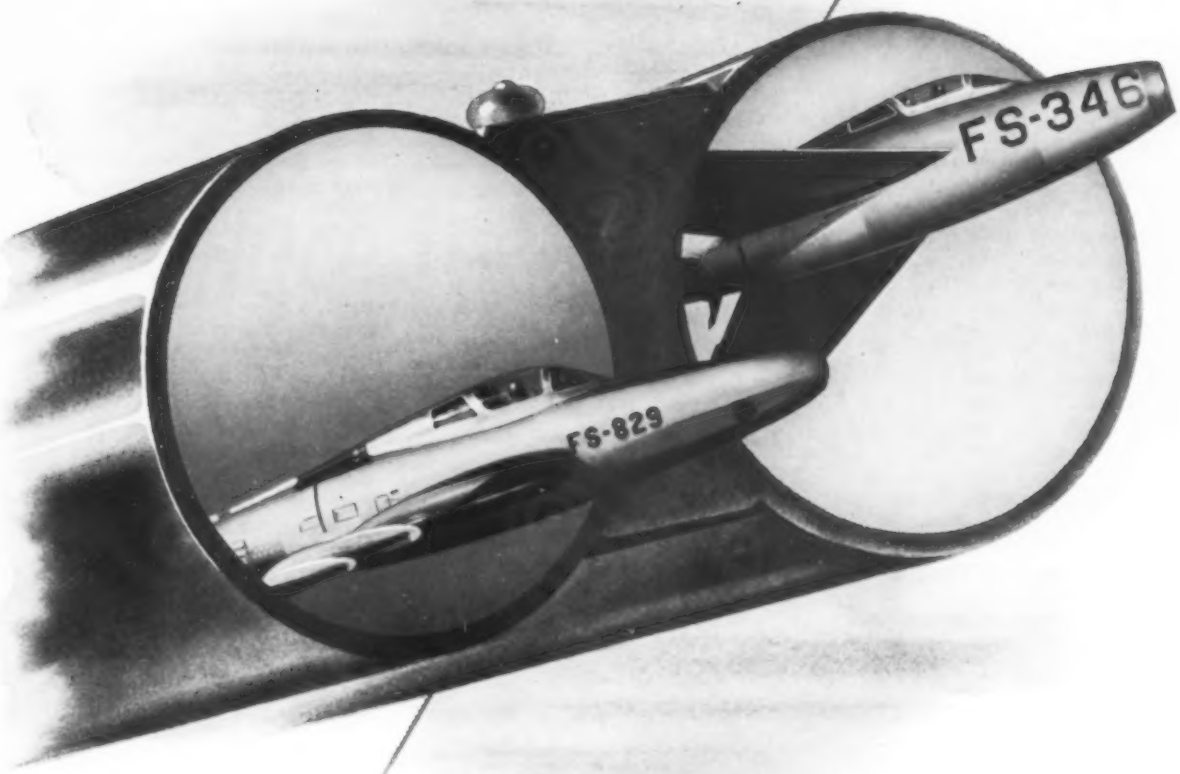
• **One matter the committee** specifically intends to prove is whether Secretary of Commerce Sinclair Weeks actually made recommendations to President Eisenhower or the White House staff in controversial Pacific area case decisions in which the CAB was overruled. Weeks has no statutory authority for interfering in such matters, Magnuson asserted.

"What's happening now," Sen. Magnuson charged, "Is that the executive departments are taking a hold of these arms of Congress and telling them 'We want this and that done.' The power to tell these agencies what to do belongs up here in Congress."

Major aviation routes are now pretty well set, the Senator believes, although "we've got to lose a little money serving the whistle stops." He indicated that the local service carriers might continue to receive good treatment subsidy-wise in his added statement that "I'm chairman of the Appropriations Committee that decides them (subsidies)."

• **The Senator apparently** is not worried about the subsidy picture stating that he suspects that the country has paid more money to the growers of peanuts and other commodities than it has to the airlines. He believes, furthermore, that subsidy has kept the American international carriers competitive. "Without competition and subsidy we would have had to spend twice as much money," he said.

DOUBLE BARRELLED!



Deadly efficient are these two defenders of Democracy . . . and the USAF is ready to "let go" with both barrels should the need arise. ➤ ➤ ➤ One of these twins, the ***F84F THUNDERSTREAK,*** *is now in active service and able on instant notice to deliver its nuclear wallop in retaliation. ➤ ➤ ➤ Its photo-reconnaissance counterpart, the* ***RF-84F THUNDERFLASH,*** *has power and speed to locate the target, identify it in detail by use of the latest aerial photographic equipment . . . and if necessary, fight its way home guarding the secrets it has uncovered.*

CEILING UNLIMITED *for the young ambitious man . . . new vistas of education, travel and security . . . all these are available to career airmen in the USAF. Every day you're in brings you greater satisfaction in the knowledge that yours is a vital and rewarding service to your country . . . to yourself.*

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FARMINGDALE, LONG ISLAND, N. Y.

Designers and Builders of the Incomparable **THUNDER-CRAFT**

COLONIAL DIRECTORS MAY BLOCK MERGER WITH EASTERN

Person or Firm	Stock Held Docket 5666	Stock Held 8/31/54	Stock Held Most Recent
Laurance Rockefeller	26,200	.....	.....
Flumen Corporation	16,000	4,700	.....
Mrs. Hugh Knowlton, Jr.	500	.....	.....
George A. Smith	200	.....	.....
Everett Cook	7,000	.....	.....
Charles Bradshaw	500	.....	.....
Ruth Bradshaw	500	.....	.....
M. Cook Barwick	500	.....	.....
Charles G. Gambrell	3,024	.....	.....
Smith Barney & Co.	7,000	.....	.....
Allen & Co.	10,800	10,000	.....
Smith, Barney & Co. for accounts of:			
James Donoghue	3,000	.....	.....
Robert B. Holland	4,100	2,200	.....
Hillman Periodicals, Inc.	4,500	400	.....
Robert B. Holland, Jr.	1,000	1,250	.....
Harriet Holland Rogers	800	1,250	.....
Laura Harding	400	.....	.....
Robert S. O. Harding	200	.....	.....
Dr. James Craig Joyner	2,200	.....	.....
Miscellaneous	3,200	455	1,055
R. F. Lafferty & Co. for accounts of:			
R. F. Lafferty & Co.	2,000	.....	.....
Bankers Trust Co.	4,800	.....	.....
George Sumers, Jr.	300	.....	.....
Barbara Lafferty	300	.....	.....
Mrs. J. M. Gross	1 000	.....	.....
Sumhill Realty Co.	800	.....	.....
Guy R. Byam	200	.....	.....
Raymond E. Lafferty	100	100	.....
Paul Lafferty	100	100	.....
Robert B. Holland	4,600	.....	.....
C. F. Abell	500	.....	.....
S. & G. Co. (B. Sohmer)	1,400	2,000	2,000
Clarence Rule	100	100	100
Rita K. Hillman	1,000	2,800	600
George Burroughs	500	500	.....
Mrs. L. J. Johnson	500	700	700
Miscellaneous	900	1,200	100
TOTAL	110,524	27,755	4,555

EASTERN AIR LINES no longer has "control" of Colonial Airlines, according to a recent CAB Examiner's finding, but the new merger agreement between the lines (signed Feb. 3) appears headed for another storm. Behind the development is an apparent split within Colonial with one faction wanting to merge with Eastern; the other wanting to "go-it-alone."

On the same day that CAB Examiner Edward T. Stodola gave Eastern a "clean bill of health" on the control charges, Colonial's board of directors, meeting quietly in New York, were considering a proposal to increase the board from seven to nine directors.

Since Colonial's board had accepted the latest Eastern merger offer by a slim 4-3 vote, the addition of two new directors could have a significant bearing on the future of the merger.

Although nothing official developed at the meeting, the directors agreed to meet again the week of March 7 with apparent intentions of voting on the increase proposal.

• **Slated for one of the new directorships,** and reportedly a sponsor of the move to increase to nine, is New York financier Edmund A. Guggenheim who has been described by Examiner Stodola as "the strongest single voting factor in Colonial."

Guggenheim, who has been referred to as an advocate of a "go it alone" policy for Colonial, "has the power to vote and control 52,100 shares of Colonial stock" and "is utterly free and independent of any influence or possible control by Eastern," according to Stodola. There are 515,600 shares of CAI stock outstanding.

Meanwhile, the merger agreement with Eastern, which has been filed for CAB approval, is scheduled to be presented for approval of Colonial stockholders at a mid-April meeting in Wilmington, Del.

• **The history of Colonial's merger** activities is a voluminous one and two firm deals in the past few years have been overturned. One, an agreement to merge with National Airlines was defeated by Colonial stockholders. The second, an agreement to merge with Eastern, gained CAB approval but was upset by President Eisenhower because of the "control" charges which Stodola now says no longer exist.

Both Eastern and Colonial have repeatedly denied that Colonial was ever influenced in its decisions by persons connected with Eastern or controlled by Eastern.

Following White House reversal of their merger a year ago, however, CAB launched an investigation of the control issues. Stodola, who handled the original merger case and the current control investigation, said that of 110,524 shares of Colonial stock alleged to be under EAL's control last year, only 1,955, shares, or less than 4/10ths of one per cent are now so held. And, Stodola added, that does not add up to control.

Thus, since Colonial agreed to sell its assets to Eastern only five weeks ago, the Stodola report, if adopted by CAB, sets up a new Colonial-Eastern merger as a very distinct possibility, although National Airlines intends to continue to press the control fight.

• **For the immediate future though,** developments apparently will turn on activities within Colonial. The "go it alone" group feels some of the line's local-type route segments could be transferred or sold to such local service carriers as Mohawk and Allegheny.

They also feel that interchanges could be set up with either National or Eastern or both for through east coast service to Florida.

Colonial, which this year will require approximately $980,000 in Federal subsidy, has been repeatedly urged by CAB in the past few years to merge into a larger trunk. Both Eastern and National, enjoying a subsidy-free status on their systems, have offered to absorb Colonial on the same basis.

There have been CAB findings that a merger of Colonial with either Eastern or National would be in the public interest.

Following last year's reversal of the Eastern-Colonial deal by the White House, CAB ruled that a Colonial-National merger had their blessing provided the two could reach agreement.

• **Although the story** has not before been told, officials of the two lines held preliminary merger talks but no agreement was ever reached. At one point in those discussions, a "split-up" of Colonial between National and Eastern was proposed by National but, when brought to EAL's attention, was deemed unacceptable.

• **The split-up would give Colonial's** New York-Montreal route to one of the two aspiring carriers and Colonial's New York-Bermuda route to the other. Local Colonial routes would then go to one or more local service carriers.

Thus Colonial, which has diligently tried to merge in line with CAB's desires for years, has come to another cross-roads. The company's directors and stockholders will decide which road to take inside of a month.

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• Reduce manpower!
• Cut time on ground!

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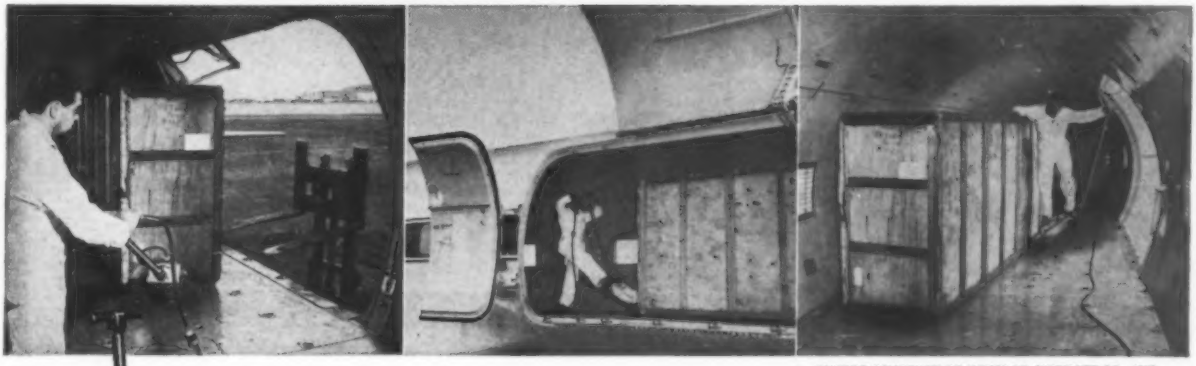

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For further details on Tug-Bar and its operation write L. A. Myhre, Executive Offices, Western Gear Works, P.O. Box 182, Lynwood, Calif.

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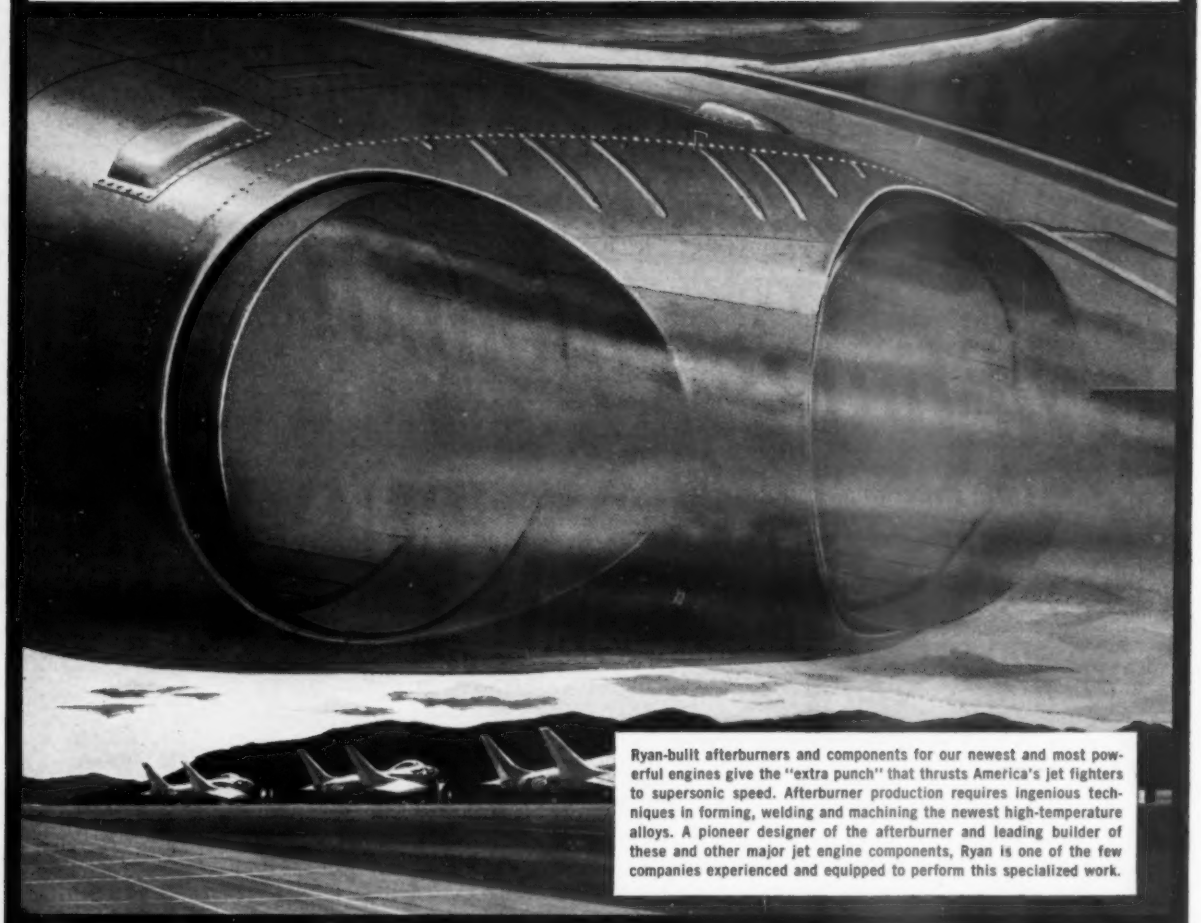

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EN ROUTE . . .

WAYNE W. PARRISH

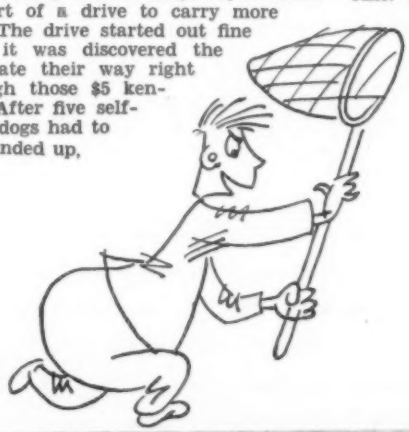
Jottings from my Notebook

A FEW issues back I mentioned the poor lighting found in most hotel rooms. This item uncovered the fact that Bob Ruddick, Washington pubrel for United Air Lines, has been carrying a 150-watt light bulb with him on every trip for years. As soon as he gets into his room he replaces the usual 40-watter with his own. Bert Holloway of Lockheed confesses he takes a 100-watt bulb with him on his trips. It's either that Ruddick's eyes are weaker or Holloway prefers to work in a subtle dim glow. In any event, I think I'll start carrying a light bulb but I'll take the 150-watt variety.

Tried out one of Western Air Lines' champagne flights not long ago (Los Angeles-Seattle) and found the service to be exceptionally good. Fine idea, serving champagne. Many people will take a wine when they will turn down a hard liquor cocktail. An excellent meal is served, too. All in all, I can give Western an AA-1 top rating for in-flight service second to none in the world. Incidentally the women passengers get orchids and the men get cigars (on leaving the plane) and it all adds up to the best type of passenger appeal, well executed. An old friend of mine, Capt. Lane Smith, was overseer of the autopilot on my flight; I made some Air Transport Command hops with him in Europe in 1945.

Hungry dogs, tasty kennels

There's a good joke going the rounds on the west coast about a whole batch of dog kennels bought by Western as part of a drive to carry more pets. The drive started out fine until it was discovered the dogs ate their way right through those $5 kennels. After five self-freed dogs had to be rounded up,



WAL decided to junk the inventory and get some kennels the muts couldn't eat through. There were some red faces in WAL's staff meetings.

Hats off to another good flight recently. Northwest's Stratocruiser trip Seattle-Twin Cities proved to be unusually comfortable and pleasant. (I sure like that airplane.) Steward H. J. Dick Bjierksen (Norwegian extraction) gets my current gold medal for excellent service. His martinis are good, too. The captain was Les Smith, a 25-year veteran who has a twin brother, Lee, flying with NWA and who has seven months more flying. These Smith

brothers ought to be written up nationally.

Here's a top-flight restaurant in Seattle: Candlis. Carl Cleveland of Boeing, who is more of a bon vivant and gourmet than you might suspect from his deceptively-innocent guise, took me there for a swell meal. The view is terrific. Carl introduced me to Kalua, a coffee liqueur which proved to be delightfully different.

And here's a "must" in San Francisco. It's Al Williams' Papagoya Room in the Fairmont Hotel, specializing in very fine Mexican dishes. Don't miss it.

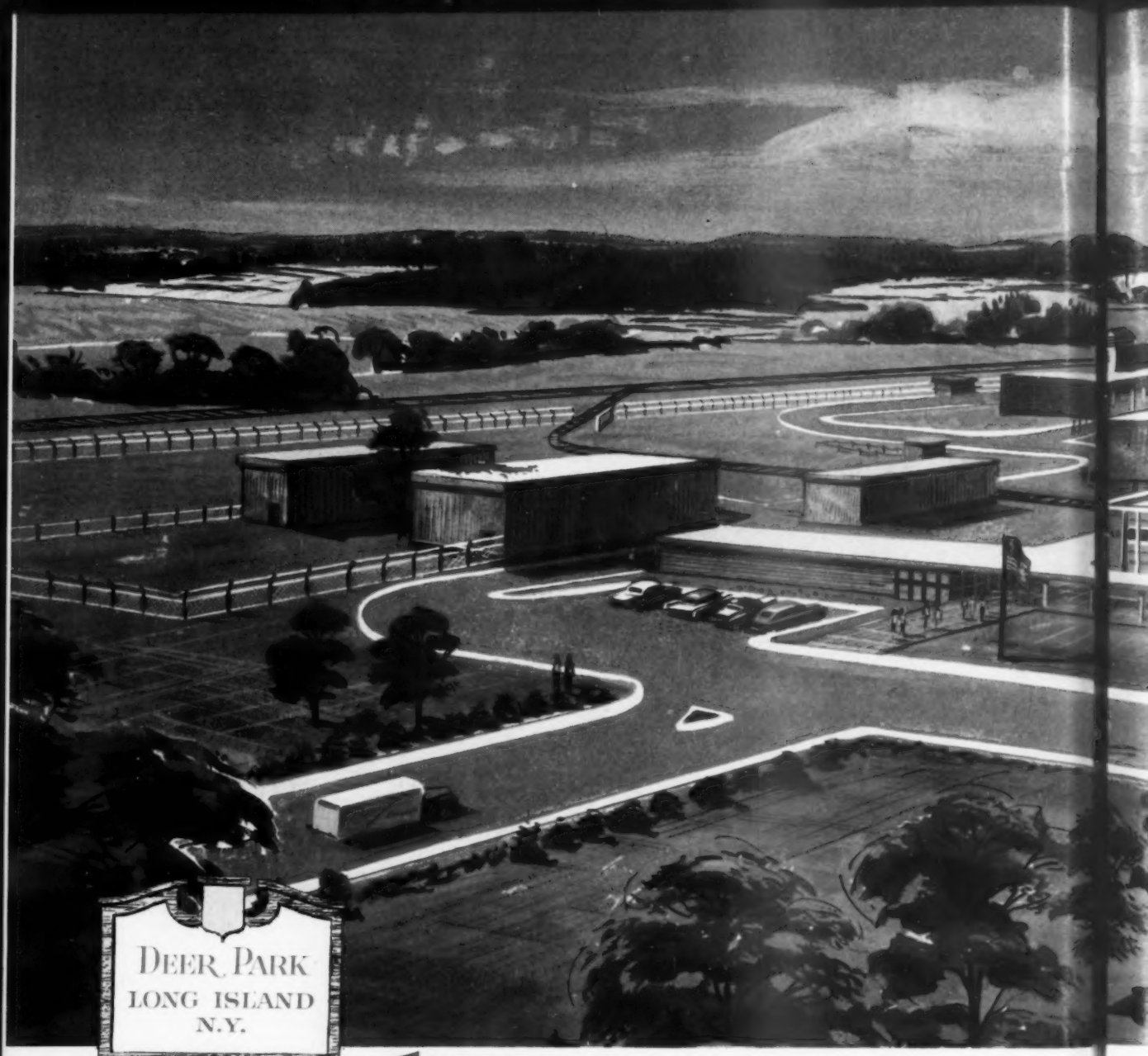
One of the best car trips...

Early in January I drove an Avis car from Los Angeles to San Francisco along the coastal route. As luck would have it, the weather turned out perfectly. Not a cloud in the sky as I maneuvered the tricky, winding road hugging the rocky coast between Pismo Beach and Monterey. One of the best car trips in America if the traffic is light and weather is good—and if the road isn't closed from slides. And nearing San Francisco, I hit through the redwood section along narrow winding roads. Those redwood trees are magnificent and there was virtually no traffic to make the drive torturous as it must be in the summer.

Heaven on a DC-7

Heard a cute story—a true one—about Henry Dreyfus, the famous New York designer. Seems he got a rush call from the west coast to get out there as fast as possible. So he packs fast, gets a seat on a DC-7 (airline shall go unnamed), goes to Idlewild, boards the airplane and takes a sleeping pill to catch up on sleep. Some hours later he wakes up in total darkness. Outside is dense fog. It's deathly quiet. Still in a stupor, Dreyfus begins to believe he's dead. He gropes around the airplane, nobody's there, and all the doors are closed. At long last a ramp crewman comes aboard to check some stuff and finds Dreyfus, by this time quite a harrassed individual trying to adjust himself to the Great Beyond. Finally turns out that the flight was cancelled hours earlier because of fog and somebody forgot to check all the seats and missed brother Dreyfus sound asleep. Guess he finally got to Los Angeles, but a little late, and much relieved.

Paris is a wonderful place, but I read in *Time* magazine recently that 180,000 people live in 16 unsanitary areas unfit for habitation within the city. No toilets or running water, no gas or electricity. In France as a whole, 2,000,000 people live in houses built before the Battle of Waterloo in 1815.



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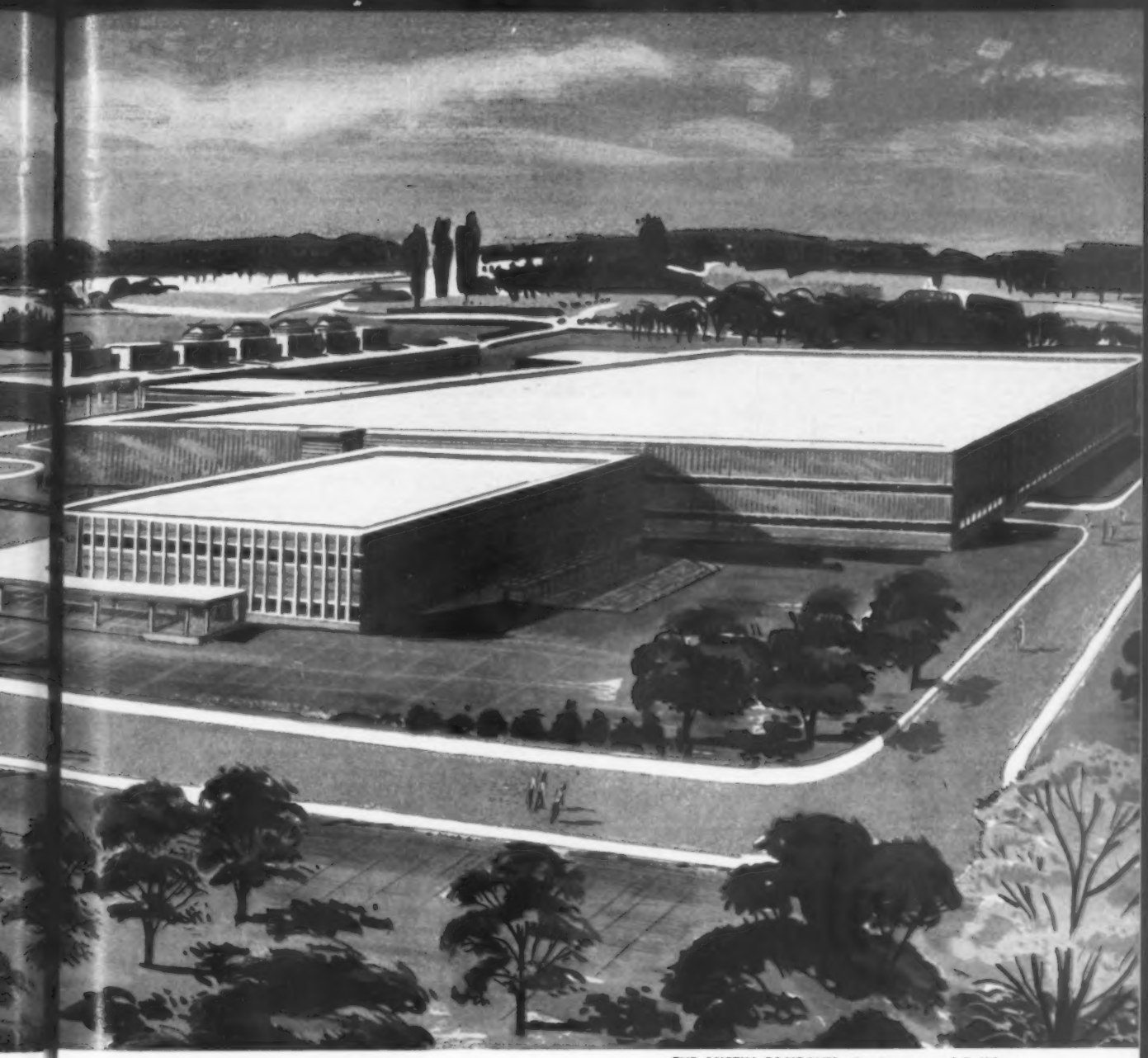
Important new developments in ***power*** are programmed for this new Fairchild Engine Division plant and turbine test laboratory now under construction at Deer Park, Long Island.

Scheduled for full-scale operations later this year, this new facility gives Fairchild Engine Division increased potential for advanced design, development and production of power for tomorrow's weapons systems and for unique power applications in industry. In addition to mass-producing small turbojets for target drones, pilotless planes and guided missiles, and weapons systems for undersea craft, Deer Park will provide modern equipment for testing and

"where the future is measured in light-years"



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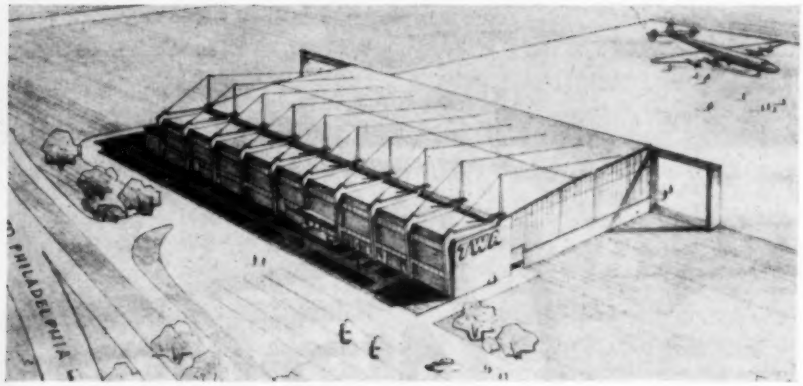
TWA Building $1 Million Hangar at Philadelphia



A new $1 million maintenance hangar of cantilever design will be built at Philadelphia International Airport for Trans World Airlines. TWA will lease the facility from the city of Philadelphia on a long-range-self-amortizing basis. Construction is expected to start early this summer and, upon completion, will replace TWA's present facility.

About 100 maintenance men will be employed at the new hangar and schedules into the airport have been increased accordingly, TWA reported. Built on half of a 12-acre tract, the hangar will provide 36,450 sq. ft. of aircraft storage space, 14,000 sq. ft. of shop area, plus 10,000 sq. ft. on the second floor for flight crew quarters. The 210,000 sq. ft. of paved taxiway and apron will include a 300 x 700 ft. apron and parking for 200 cars.

UAL Ad Budget Boosted

A shift in emphasis will mark United Air Lines' advertising during 1955, with cartoons used in Sunday comic sections and a 50% increase in trade periodical space. Service will be the dominant theme, rather than speed and price. The magazine campaign will include a question-and-answer series ("What airline gives a man elbow room?").

The cartoons, which will be tested in seven cities, will deal with air coach travel, while trade publication advertisements will emphasize air cargo.

The UAL advertising budget was substantially increased over last year's reported $2.5 million. Agency is N. W. Ayer & Son.

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Undisplayed Advertising: $1.00 per line, minimum charge $4.00. Cash with order. Estimate 30 capital letters and spaces per line; 40 small lower-case letters and spaces per line. Add two lines if Box Number is included in lieu of advertiser's name and address.

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R2000-D5, -15 R1340 R985
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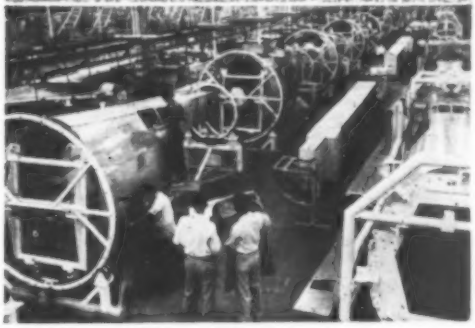

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